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222 West 7th Avenue, #13
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Soil and Vegetation Survey of the Gulkana River Area, Alaska

Volume 1

Mark H. Clark and Darrell R. Kautz

Mission Statement

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Cover Photo

Lower Middle Fork of the Gulkana River. Along this stretch, the meandering, single-threaded channel is confined within adjacent glaciolacustrine uplands. A narrow floodplain, cut-off meanders, and incised stream terraces characterize the valley floor. The numerous small lakes and wet meadows in depressions and abandoned channels provide excellent habitat for a variety of wildlife species.

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Soil and Vegetation Survey of the Gulkana River Area, Alaska

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fieldwork by:
Jeff Allen, Mark Clark, Scott Guyer, John Hemple,
Darrell Kautz, Larry Edland, and Joe White

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United States Department of Agriculture
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Soil and Vegetation Survey of
Gulkana River Area, Alaska

Final Report

July 1999

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United States Department of Agriculture, Natural Resources Conservation Service

In cooperation with:
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This survey was made cooperatively by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS) and the United States Department of Interior, Bureau of Land Management (BLM).

Maps in this report may be copied without permission. However, enlargement of these maps could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils and vegetation that could have been shown at a larger scale.

All programs and services of the Natural Resources Conservation Service and the Bureau of Land Management are offered on a nondiscriminatory basis, without regard to race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, marital or family status.

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This survey could not have been completed without the enthusiastic support and assistance of many individuals. Mark Phillips, Mike Coffeen, and other staff at the BLM District Office in Glennallen arranged air taxi, provided field equipment, shuttled vehicles, and assisted with other logistics. Lynette Nakazawa and staff in the BLM Mapping Division in Anchorage provided aerial photography and orthophotography, and compiled and digitized soil and vegetation polygons. Ted Cox, GIS Specialist, NRCS, and staff georeferenced the digital line work to the orthophotography and produced the final map products for this report. Linda Giani, NRCS Editorial Assistant, provided editorial and publication assistance. Dwight Hovland, Soil Scientist, BLM State Office, and Joe Moore, State Soil Scientist, NRCS, provided administrative support and manuscript review.

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Introduction

The Gulkana River area is located in the northern Copper River Basin in Southcentral Alaska, approximately 190 miles (304 km) northeast of Anchorage (Figure 1). Lands adjacent to the river are public lands administered by the United States Department of Interior, Bureau of Land Management. Primary land uses include recreation and fish and wildlife habitat. In 1980, the Gulkana River was designated as a "wild river" under the Wild and Scenic Rivers Act, P.L. 90-542.

The Gulkana River area includes approximately 92,700 acres (37,544 ha) within a corridor one to two miles (1.6 to 3.2 km) wide along portions of the Main Stem, Middle Fork, and West Fork tributaries (Figure 1). The Main Stem runs from the outlet of Paxson Lake south to Sourdough. The Middle Fork begins at Dickey Lake and joins the Main Stem about two air miles (3.2 km) below the outlet of Paxson Lake. The West Fork consists of the North and South Branches at the upper end and the lower West Fork. The West Fork begins at the confluence of the North and South Branches and joins the Main Stem about five air miles (8 km) northwest of Sourdough.

Survey Purpose

The primary purpose of the survey was to describe and map the soils and vegetation of the Gulkana River area. Area soils and vegetation were mapped at a scale of 1:24,000 and detailed descriptions of the map units, soil types, and vegetation cover types were developed.

As an aid to understanding the detailed soil and vegetation information and to provide a more general description and maps of area resources, the detailed soil map was integrated into a multi-level ecological stratification of the area based on National Hierarchical Framework of Ecological Units (*ECOMAP 1993*). Subsection level units were mapped at a scale of 1:200,000. Landtype Association units were mapped at a scale of 1:100,000. Detailed descriptions of the Subsections and Landtype Associations were developed. Higher levels in the system were mapped and described as part of Alaska statewide (*Nowacki and Brock 1995*) and national efforts (*McNab and Avers 1994*; *Bailey et al. 1994*). The classification and mapping hierarchy for the Gulkana River area is described in Appendix A of this report.

Report Format

For ease of use, this report was published in two volumes. Volume 1 includes:

- Map unit descriptions for the Subsection and Landtype Association maps
- Map unit descriptions for the soil and vegetation maps

- Interpretations for recreation and wildlife habitat
- Descriptions of soil properties and selected interpretative groups
- Descriptions of the soils and vegetation cover types
- Non-technical descriptions of area ecological sites

The four sets of resource maps are bound separately in volume 2. Volume 2 map sets include:

- 1:200,000 Subsection map
- 1:100,000 Landtype Association map
- 1:24,000 soil map
- 1:24,000 vegetation map

The 1:24,000 soil and vegetation maps are printed on an orthophoto background. Orthophotography was developed by the BLM from color infrared (CIR) aerial photography taken in July 1989.

Other Products

All data, maps, orthophotography, and this report have been produced and maintained in a digital format. Electronic copies of this report, including plates and figures, map data, and metadata, can be obtained either through the BLM District Manager in Glennallen or the BLM State Director in Anchorage. Soils and vegetation field data and composite data for the soil map units can be obtained through the NRCS State Conservationist in Anchorage.

Initial soil and vegetation mapping was done on mylar overlays to color infrared aerial photography. Original overlays are on file in the Mapping Division, BLM, Anchorage.

This survey was a cooperative effort of the United States Department of Agriculture, Natural Resources Conservation Service (NRCS) and the United States Department of Interior, Bureau of Land Management (BLM). NRCS was responsible for survey design and methodology, data collection and analysis, and this report. Fieldwork was completed in July, August, and early September of 1992, ‘94, and ‘95. Soil names and descriptions were approved in 1996. Unless indicated otherwise, maps and supporting documentation in this report refer to conditions in the survey area in 1995.

Part 1—General Nature of the Area

The Gulkana River

The Gulkana River is a non-glacial, clear-water tributary of the Copper River. The Main Stem and the Middle Fork originate in the Gulkana Uplands physiographic region (*Wahrhaftig 1965*). The Main Stem begins above Summit Lake, about 10 miles (16 km) north of Paxson Lake, at an elevation of about 4,000 feet (1,219 m). The Middle Fork begins in a small group of lakes in the uplands southwest of Dickey Lake at about 3,300 feet (1,006 m) elevation. The North and South Branches of the West Fork originate in the lakes and hills of the Lake Louise Plateau physiographic region (*Wahrhaftig 1965*) about 20 miles (32 km) north of Lake Louise at about 2,400 feet (732 m) elevation (Figure 1).

Within the Gulkana River area, much of the river is entrenched in fine grained glaciolacustrine sediments. At Canyon Rapids on the Main Stem and along the upper Middle Fork, bedrock canyon walls confine the channel. Most reaches of the river consist of meandering, single thread, low gradient channels. Moderate gradient reaches occur on the Main Stem from the outlet of Paxson Lake to the confluence with the Middle Fork, and from Canyon Rapids downstream for a distance of about 7 miles (11.2 km). The gradient of the upper Middle Fork, for a distance of about 6 miles (10 km) below Dickey Lake, also is moderate.

Channel width and discharge varies tremendously at different points within the system. For example, channel width ranges from about 10 feet (3 m) in places along the upper North Branch to as much as 225 feet (68.6 m) at Sourdough. Mean August discharge on the North Branch at the confluence with the South Branch is 140 ft^3/s (3.9 m^3/s); and at Sourdough, it is 1,330 ft^3/s (37.2 m^3/s). Shelby et al. (*1990*) describe channel characteristics and flow rates.

The Gulkana River exhibits considerable variation in stream flow during the warm summer months. Water level can rise markedly and rapidly during and after intensive or long duration storms. In July 1995, a particularly intense storm resulted in an increase in the water depth along the upper North Branch of approximately 3 feet (0.9 m) in a 24-hour period. However, peak flows tend to be moderated to a large degree by the lack of integrated drainage networks and the high storage capacity of the drainage basin. Extensive bogs, lakes, and other wetlands in the drainage basin have the capacity to store water and release it to the river system at a slow, steady rate over the summer and fall. Ingram and Carrick (*1983*) describe, in greater detail, the influence of climate, physiography, and permafrost on the hydrology of the Gulkana River.

Climate

The climate of the northern Copper River Basin is subarctic continental, characterized by long, cold winters and short, warm summers. Mean January temperature is 1°F (-17.2°C) at Paxson (north end of Paxson Lake outside the survey area), and -2°F (-19.1°C) at Sourdough (Table 1 and Table 2). Daily low temperatures of -50°F (-46°C) or less occur frequently during the winter. Two week or longer periods of severe cold weather are common. Mean July temperature is 53°F (11.8°C) at Paxson and 54°F (12.3°C) at

Sourdough. Daily high temperatures in summer occasionally exceed 80°F (27°C). Daily minimum temperatures in summer are generally between 37° to 42°F (2.8° to 5.6°C); however, freezing temperatures have been recorded in every month.

Mean annual precipitation is 21.2 inches (53.8 cm) at Paxson and 15.6 inches (39.6 cm) at Sourdough (Table 1 and Table 2). Average annual snowfall is 102.2 inches (259.6 cm) at Paxson and 54.4 inches (138.2 cm) at Sourdough.

Physiography

Elevation is 2,553 feet (778 m) at Paxson Lake and approximately 1,850 feet (564 m) at Sourdough. Dickey Lake, the highest point on the river within the survey area, has an elevation of 2,870 feet (875 m). At the upper ends of the North and South Branches, the elevation reaches approximately 2,600 feet (792 m) and 2,400 feet (732 m), respectively. The highest elevation in the area, on the mountain slopes just west of the confluence of the Main Stem and Middle Fork, is approximately 3,575 feet (1,090 m).

Immediately adjacent to the majority of the river channel, the landscape consists of a complex of nearly level to moderately sloping flood plains and stream terraces. Other common flood plain features include point bars, cutoff meanders, and backswamps. Oxbow lakes and small lakes and ponds in depressions are present on many stream terraces. Steep escarpments and bluffs as much as 200 feet (61 m) high parallel the river corridor in many places.

Uplands in the northern and northwestern portion of the survey area consist of strongly sloping to steep glacial hills and glacial and bedrock cored mountains at higher elevations. Undulating glaciolacustrine terraces and pitted outwash plains are at lower elevations. In the southern and southwestern portion of the area, the landscape consists of broad, nearly level to undulating lacustrine terraces, which extend for several miles on each side of the river. Loamy and clayey lacustrine sediments were deposited approximately 35,000 to 9,000 years ago in a large glacial lake that covered much of the central Copper River Basin (*Ferrians, Nichols, and Williams 1983*). Other features associated with the terraces include scattered areas of gravelly and sandy glaciofluvial deposits and glaciolacustrine strandline deposits.

Many upland landforms are mantled with a thin, discontinuous layer of silty loess. Most loess was deposited rapidly following drainage of the glacial lake, when exposed lakebed and flood plains were more extensive and nearby glaciers created strong proglacial winds. At present, the principal source of loess in the Copper River Basin is the braided, mostly barren flood plains of the Copper River and its tributaries. Within the survey area, the loess mantle is relatively thin and often intermittent due to the fairly long distance from these source areas. The thickest deposits of loess are on hills, mountains, pitted outwash plains, and strandline deposits.

Peat and other organic deposits mantle extensive areas on glaciolacustrine terraces and stream terraces. These range from surface organic mats 8 to 16 inches (20 to 41 cm) thick to peat deposits many feet thick in bogs, fens, and wet meadows. Elevated peat mounds are present on stream terraces near the confluence of the Middle Fork and Main Stem and along the margins of ponds and lakes throughout the area.

Permafrost

The mean annual air temperature in the Copper River Basin is less than 26°F (less than -3.3°C), and permafrost, perennially frozen ground, underlies most of the Basin. In the Gulkana River survey area, shallow permafrost is generally absent on flood plains.

With increasing terrace height and age and distance from the river channel, permafrost within the soil profile is common, often at a relatively shallow depth. Shallow permafrost is extensive on the highest and oldest stream terraces and in the uplands.

The depth at which permafrost occurs and the ice content vary widely. In most places, permafrost results in small ice crystals disseminated throughout the soil. On glaciolacustrine terraces, a perched water table and saturated conditions are common above the permafrost during the summer due to restricted drainage. Peat mounds (palsen) typically have shallow permafrost and a core of massive ice. The surface peat is usually well drained and relatively dry.

Wildfires, which are common in the boreal forest zone of the Copper River Basin, can have a profound impact on the distribution and depth of permafrost. Concurrent with vegetation succession on stream terrace and upland soils is the development of a thick, insulating layer of moss and organic material on the soil surface. Partial to complete incineration of this moss-organic layer reduces the insulating capacity of the soil and allows increased heat transfer into the soil during the summer. In addition, the lower albedo of the blackened surface following a burn absorbs more solar radiation.

The short-term impact following most wildfires is thawing of the permafrost and an increase in the thickness of the surface active layer. As permafrost thaws, a large volume of water is liberated and either accumulates in depressions or runs off through surface or subsurface drainage outlets. Differential subsidence of the soil surface and slumping on steeper slopes can occur, depending on the ice content of the permafrost and the rate of thawing. Gradually, in the absence of additional fires or disturbances, the moss-organic layer re-develops and the permafrost level returns to the pre-fire condition (*Foote 1976; Viereck 1973*).

Wildlife

Approximately 33 species of mammals are known to inhabit the survey area (*Rucks 1977*). The area is within the winter range and calving grounds of the Nelchina caribou herd. Moose are common at higher elevations in the summer and fall and concentrate along the river during winter. Both black and grizzly bears inhabit the area—black bears intensively utilize the flood plains and stream terraces; grizzly bears are present throughout the uplands and concentrate along the river when spawning salmon are present. Among the more important furbearers in the area are coyote, wolf, red fox, marten, mink, lynx, river otter, muskrat, and beaver. Snowshoe hare and porcupine are common and cause considerable damage to trees.

Approximately 135 species of birds are summer residents of Interior Alaska; another three dozen or so are spring-fall migrants or occasional visitors to the region (*Armstrong 1980*). A variety of waterfowl, including Tundra Swans, nest in the survey area and utilize local lakes and ponds for rearing young. Along the river, bald eagles nest and fish and, prior to migration in August, swans are common in many places. Spruce grouse frequent spruce forests throughout the area.

Albin (*1977*) identified 11 fish species known to inhabit or migrate through the area. Chinook and sockeye salmon and steelhead return to the Gulkana River to spawn. Arctic grayling and rainbow trout are year-round residents. Other fish species include lake trout, whitefish, burbot, sucker, sculpin, and lamprey.

Recreation

Due to the small amount of development in the area, the Gulkana River is largely a

wilderness river that provides excellent remote and backcountry recreational opportunities, including flat water and white water boating, camping, moose and caribou hunting, fishing, wildlife viewing, and hiking. Within the survey area, most of the Gulkana River is flat water and Class I-II white water. Depending on water levels, moderate gradient reaches on the upper Middle Fork and Main Stem are Class III-IV white water. Inexperienced boaters may find it necessary to portage around Class III-IV rapids and reaches. At low water levels, boats may need to be dragged or carried through some reaches in the upper sections of the Middle and West Forks and below Paxson Lake on the Main Stem. Lack of adequate water in the channel in the dry summer of 1994 forced survey crews to drag boats down most of the South Branch.

The Main Stem of the Gulkana River is one of the most popular recreational rivers in Southcentral Alaska, and one of only a handful of Alaskan rivers with put-in and take-out access from the highway. The Main Stem is accessible from the Richardson highway at Paxson Lake, Sourdough, and Gulkana (ca. 18 miles [29 km] south of Sourdough). Ice breakup on Paxson Lake usually occurs in mid to late May and the floating season extends into September in most years.

The Main Stem has experienced a tremendous increase in user days and related impacts in the past 15 years. As recently as 1982, only a few choice locations had frequently used camp sites and fire rings. Today, most suitable sites show some evidence of use. Availability of firewood in frequently used camping areas is limited and increasing damage to live standing trees is apparent. Pit toilets are available at only three locations between Paxson Lake and Sourdough, and human waste and refuse is a noticeable problem in some areas. Associated with the increased use has been an increase in fishing pressure and, in all likelihood, a reduction in the numbers and size of grayling and rainbow trout.

The West Fork and Middle Fork provide recreational opportunities similar to the Main Stem; however, these tributaries do not have direct put-in access from the highway. Both forks are accessible by float plane into headwater lakes or by a combination of lake paddling and portaging. The Middle Fork is also accessible via ATV trails to Dickey Lake. Jet boats can run up the lower Main Stem and West Fork, from Sourdough, in high water. Use on the Middle Fork and West Fork is insignificant except during hunting season. Survey crews encountered other river users on only two occasions in nearly 60 days of field work on these tributaries. Established campsites along the river and ATV trails are few, and where present, there is little evidence of use.

Part 2—Resource Descriptions

SUBSECTION AND LANDTYPE ASSOCIATION MAPS

Subsections and Landtype Associations of the Gulkana River area are based on the National Hierarchical Framework of Ecological Units (*ECOMAP 1993*). The seven levels of the hierarchy, beginning with the highest and most general level, are Domain, Division, Province, Section, Subsection, Landtype Association, Landtype, and Landtype Phase. A description of hierarchy as applied to the Gulkana River area is included in Appendix A.

The descriptions in this section refer to the 1:200,000 Subsection map and 1:100,000 Landtype Association map in Volume 2 of this report. The soil map units and the 1:24,000 soil map, also described in Part 2 of this report, are equivalent to the Landtype level of the hierarchy. Table 3 lists the complete hierarchy for the Gulkana River area, from the Domain through the Soil Map Unit (Landtype) levels.

The Subsection and Landtype Association levels for the Gulkana River area are defined as follows:

Subsections. Subsections are aggregations of Landtype Associations based on similarities in surficial geology, geomorphic processes, soil groups, and potential vegetation.

Landtype Associations. Landtype Associations are aggregations of soil map units and represent land areas having a distinctive pattern of landforms, soil types, relief, drainage, vegetation cover types, and channel characteristics. Soil map units making up one Landtype Association can occur in other units but in a different pattern and composition.

The Subsection and Landtype Association maps and descriptions provide a general overview and understanding of the pattern and distribution of Gulkana River area landform, soil, and vegetation resources. The Subsection and Landtype Association maps and descriptions can be used to help assimilate, understand, and apply the more detailed resource information associated with the soil and vegetation maps. Resource information at the Subsection and Landtype Association levels is directly relevant to statewide and area-wide planning, modeling, and management activities.

135A1—Gulkana River Flood Plains and Stream Terraces Subsection

This Subsection includes the gently sloping flood plains, stream terraces and associated oxbow lakes, backswamps, levees, and point bars adjacent to the Gulkana River. Also included are alluvial fans and fan terraces emerging from the uplands into the river corridor. Soils formed in sandy and gravelly alluvium or stratified loamy alluvium over sandy and gravelly alluvium. On fan terraces, these deposits are mantled with a thin layer of loess. Permafrost is generally absent on low to mid level flood plains and discontinuous on high flood plains and stream terraces. Potential vegetation is alder

(*Alnus spp.*) and willow (*Salix spp.*) scrub on low flood plains, productive white spruce (*Picea glauca*) forest on high flood plains, and moderate to low productive spruce (*Picea* spp.) woodland on terraces and fans.

The Gulkana River is a young, low to moderate gradient, perennial river system and one of the few non-glacial, clear water rivers in the Copper River Basin. Along most reaches, the river cut a narrow valley through glaciolacustrine and glaciofluvial deposits. Down-cutting incised the river valley as much as 200 feet (61 m) in places. The channel ranges from straight to highly sinuous. Lateral channel movement widened the valley bottom to a mile or more in some downstream locations. Compared with glacial rivers, the Gulkana River experiences considerably greater variation in seasonal stream flow. However, to a large degree, poorly developed tributary drainage networks and several large lakes within the drainage system tend to buffer peak flows (*Shelby et al. 1990*). Many lakes and ponds in the watershed are not part of integrated surface drainage networks.

Extent within the Gulkana River area: 21,901 acres (8,867 ha); 23.8 percent of the survey area

Major Geomorphic and Soil Processes

Flood plains:
Fluvial processes—periodic erosion and deposition of sediments—are the overriding processes on these landforms.

Other active processes are: *hydromorphism*—a process associated with saturated soil conditions; *alkalinization*—a process in which deposition of base rich alluvium and further concentration of carbonates and nutrients in surface layers occur due to a combination of hydrologic processes and evapotranspiration; and *acidification*—the removal of soil bases by plant use and percolation of precipitation.

Stream terraces and alluvial fan terraces:
The processes associated with stream terraces and alluvial fan terraces differ from flood plains, as these terraces rarely flood and fire disturbance is common. Two major soil groups are found on terraces in this Subsection. The first includes soils formed in sandy and gravelly alluvium where permafrost is generally absent. Major processes in these soils include *acidification* (previously described) and *alteration and translocation of soil minerals*—the weathering and downward translocation of soil minerals in the soil profile.

The second group includes soils formed in thick stratified loamy alluvial deposits with shallow, ice-rich permafrost and poorly drained conditions. Important processes in these soils are *acidification*, *hydromorphism,* and *cryoturbation*. *Cryoturbation* is the churning of surface and subsoil layers by frost action.

Alkalinization is an active process in both coarse texture and loamy texture soil groups where spruce (*Picea spp.*) forest vegetation is present and where fire has recently occurred. This process differs from that previously described for flood plains. On stream terraces and alluvial fan terraces, *alkalinization* is initiated by the deposition of nutrient rich ash on the soil surface by wildfire.

A more detailed description of soil and geomorphic processes is included in Appendix B.

Vegetation Patterns

Flood plains in the Gulkana River area are divided into two distinct zones based on

differences in major seral plant species and cover types. In the “alder” zone, early succession is dominated by *Alnus tenuifolia* and *Salix alexensis*, which form pure and mixed scrub communities on low and mid flood plains. *Populus balsamifera,* and mixed *P. balsamifera* and *Picea glauca* forest with *A. tenuifolia* dominated understory, are on mid and high flood plains. This zone includes most of the lower reaches of the river south of Canyon Rapids on the Main Stem, the lower reaches of the North and South Branches, and the West Fork. The alder zone encompasses Landtype Associations 135A1.V3—Southcentral Loamy Flood Plains and Stream Terraces and 135A1.V4—Southern Loamy Flood Plains and Stream Terraces.

The “willow” zone is characterized by *Salix planifolia*, *S. barclayi*, and *S. monticola* scrub on low and mid flood plains; and *Picea glauca* forest with willow understory on mid and high flood plains. *Populus balsamifera* is rare, occurring only as occasional isolated trees or small stands. This zone includes that area north of Canyon Rapids on the Main Stem and Middle Fork, and the upper reaches of the North and South Branches. The willow zone encompasses Landtype Associations 135A1.V1—Gravelly and Loamy Flood Plains, 135A1.V2—Northcentral Loamy Flood Plains, 135A1.V5—Lower Middle Fork Flood Plains and Stream Terraces, and 135A1.V7—South Branch Loamy Flood Plains and Stream Terraces.

In both the alder and willow zones, vegetation on stream terraces is dominated by mixed spruce (*Picea glauca* and *Picea mariana*) woodland with wet meadows and low scrub in cutoff meanders, depressions, and on the shores of lakes and ponds.

Vegetation patterns and potential are closely correlated with the height of the flood plains and terraces above the river channel and related flooding frequency and duration, landform position, apparent surface age, and soil characteristics. Generalized topo and chronosequence of landforms, soils, and cover types are represented in Figures 4 and 5 in the alder zone and Figures 1, 2, 3, 6, and 8 in the willow zone.

135A1.V1—Gravelly and Loamy Flood Plains Landtype Association

(Figures 2 and 3; Plates 2—upper photo and 3)

Geographic Setting

Distribution: along the Main Stem between the outlet of Paxson Lake and the Middle Fork confluence, the Middle Fork for about 5 miles (8 km) below Dickey Lake, the upper 2 miles (3.2 km) of the North Branch, and on the Keg Creek flood plain on the North Branch

Approximate extent: 1,199 acres (485 ha); 1.4 percent of the survey area

Principal Ecological Sites

Gravelly flood plains, moderately wet
Loamy flood plains, wet
Loamy riverbanks
Escarpments (minor occurrence)

Principal Soil Map Units

FP1—Tangoe sandy loam, frequently flooded
FP12—Tangoe, wet, complex
FP13—Swedna, high elevation-Hisna complex, 0 to 6 percent slopes
FP21—Swedna, high elevation, complex
ST12—Ogtna mucky fine sandy loam

Physiography

Landforms: low flood plains and small areas of high flood plains; low stream terraces in scattered locations
Elevation: 2,350 to 2,900 feet (716 to 884 m)
Slope: 0 to 6 percent
River channel: straight to occasionally slightly sinuous; unconfined to occasionally entrenched (Middle Fork canyon)
Channel gradient: 30 to 38 feet/mile (5.7 to 7.2 m/km) (*Ingram and Carrick 1983*)
Terrace height: low flood plains 0 to about 3 feet (0 to about 1 m) above the height of the channel
Flooding frequency: frequent to occasional

Dominant Soils

Tangoe, frequently flooded
Tangoe, wet, frequently flooded
Tangoe, wet, occasionally flooded
Swedna, high elevation
Hisna

Soil notes:

Dominant soil materials include stratified loamy alluvium over sandy and gravelly alluvium. The soils are somewhat poorly to very poorly drained with a very shallow to moderately deep water table, which fluctuates in response to changing river levels. Ponding is common in depressions during periods of high stream flow.

Soils of minor extent: Ogtna

Ogtna soils formed in stratified loamy over gravelly alluvium on discontinuous, small stream terraces.

Dominant Vegetation

Flood plains and low stream terraces:

- Low willow/herb scrub
- Low willow/water sedge scrub (areas with very shallow water table or long duration ponding)
- Sedge-grass riparian meadow (adjacent to the channel and areas with season-long ponding)
- Tall feltleaf willow scrub (adjacent to the channel)

Vegetation notes:

In many places with better soil drainage, in particular along the upper Main Stem and Keg Creek, white spruce saplings and seedlings and scattered trees are common in Low willow/herb scrub. Small stands of White spruce/willow open forest are on scattered high flood plains and stream terraces.

Wildlife Habitat Notes

Extensive, often heavy, moose browsing is evident throughout most of this Landtype Association. Willow hedging ranges from slight to severe; in some locations, the stand above 4 to 5 feet (1.2 to 1.5 m) consists primarily of dead, broken stems. The upper level of live growth may also indicate average winter snow depth.

Beaver activity is extensive along the upper Middle Fork. Dams, ponds, and

interconnecting channels appear to be maintained by beavers. The shallow water table in the soils, and surface ponding in places, can be at least partly attributed to beaver activity.

135A1.V2—Northcentral Loamy Flood Plains and Stream Terraces Landtype Association

(Figure 4; Plate 2—lower photo)

Geographic Setting

Distribution: along the upper Middle Fork, the Main Stem between the Middle Fork confluence and Canyon Rapids, and the upper North Branch
Approximate extent: 2,420 acres (980 ha); 2.7 percent of the survey area

Principal Ecological Sites

Loamy flood plains, moderately wet
Loamy high flood plains
Stream terraces, frozen
Wet depressions (minor occurrence)
Loamy flood plains, wet (minor occurrence)
Loamy riverbanks (minor occurrence)

Principal Soil Map Units

FP2—Dackey, cool-Swedna-Swedna, very poorly drained, complex, 0 to 8 percent slopes
FP22—Dackey, cool-Swedna, high elevation-Kluna complex
ST1—Klute and Kluna soils, 0 to 3 percent slopes
ST11—Klute-Tangoe, occasionally flooded, complex
ST13—Tangoe, occasionally flooded-Klute, occasionally flooded, complex, 2 to 7 percent slopes
ST2—Kuslinad-Pergelic Cryohemists, dry-Hufman complex, 0 to 14 percent slopes
ST21—Kuslinad peat
ST31—Dackey, cool-Hogan, cool, complex, 0 to 4 percent slopes
ST441—Kuslinad-Dackey, cool, complex, 0 to 2 percent slopes

Physiography

Landforms: low to high flood plains; stream terraces that occur as discontinuous, small segments within channel meanders
Elevation: 2,350 to 2,600 feet (716 to 792 m)
Slope: 0 to 8 percent; occasionally to 15 percent or greater
River channel: mostly moderately sinuous; occasionally to frequently confined by glaciolacustrine uplands
Channel gradient: 7 to 25 feet/mile (1.3 to 4.7 m/km) (*Ingram and Carrick 1983*)
Terrace height: 0 to 8 feet (0 to 2.4 m) above the height of the channel
Flooding frequency: frequent to rare

Dominant Soils

Flood plains:
Swedna
Klute
Dackey, cool

High flood plains and stream terraces:
Hogan, cool
Kuslinad

Soil notes:
Swedna, Klute, and Dackey, cool, soils formed in stratified loamy alluvium of varying thickness over sandy and gravelly alluvium. Depth to water table varies from very shallow to deep depending on terrace height and proximity to the channel. Hogan, cool, and Kuslinad soils formed in stratified sandy and silty alluvium and are shallow to moderately deep over permafrost. Kuslinad soils have a water table perched on the permafrost.

Soils of minor extent: Hufman and Pergelic Cryohemists

The very poorly drained Hufman soils formed in thick organic deposits along the margins of lakes and ponds in depressions and abandoned channels. The very poorly to poorly drained Pergelic Cryohemists soils formed in thick organic deposits on stream terraces.

Dominant Vegetation

Low flood plains:
Low willow/herb scrub
High flood plains:
White spruce/willow open forest (occasionally on stream terraces)
Stream terraces:
Spruce/shrub birch woodland

Vegetation notes:
Sedge-grass riparian meadow occurs along the permanently wetted banks of the river channel. Sedge wet meadow occurs in sloughs and abandoned channels.

135A1.V3—Southcentral Loamy Flood Plains and Stream Terraces Landtype Association

(Figure 5; Plate 11)

Geographic Setting

Distribution: along the Main Stem from Canyon Rapids south for about 10 miles (16 km) and along the lower North and South Branches and the upper West Fork
Approximate extent: 4,736 acres (1,917 ha); 5.4 percent of the survey area

Principal Ecological Sites

Stream terraces, frozen
Loamy flood plains
Stream terraces
Terraces, wet (minor occurrence)
Loamy high flood plains, frozen (minor occurrence)
Escarpments (minor occurrence)

Principal Soil Map Units

ST21—Kuslinad peat
ST3—Dackey-Hogan complex, 0 to 4 percent slopes

ST41—Maclaren-Sinona complex, 0 to 15 percent slopes
ST411—Maclaren-Kuslinad complex, 0 to 15 percent slopes

Physiography

Landforms: low to high flood plains and stream terraces
Elevation: 2,000 to 2,400 feet (610 to 732 m)
Slope: mostly 0 to 3 percent; up to 35 percent or more on side slopes of dissected terraces
River channel: moderately sinuous with occasional to common short, straight reaches along the North and South Branches and West Fork; alternating short straight drops and sinuous segments in the Main Stem canyon; occasionally confined to entrenched (Main Stem canyon)
Channel gradient: about 16 feet/mile (3.0 m/km) along the North and South Branches and the West Fork; about 50 feet/mile (19m/km) in the Middle Fork canyon (*Ingram and Carrick 1983*)
Terrace height: less than 1 to more than 12 feet (less than 0.2 to more than 3.7 m) above the height of the channel
Flooding frequency: frequent to none

Physiography notes:
This Landtype Association is bordered along much of its length by very steep, discontinuous bluffs and escarpments up to 200 feet (61 m) or more in height.

Dominant Soils

Low and mid flood plains:
Dackey
Klute
High flood plains:
Hogan
Stream terraces:
Maclaren
Sinona
Kuslinad

Soil notes:
Dackey, Klute, Maclaren, and Sinona soils formed in stratified loamy alluvium of varying thickness over sandy and gravelly alluvium. Hogan and Kuslinad soils formed in stratified loamy alluvium and are very shallow to moderately deep over permafrost. Depth to seasonally high water table in Dackey and Klute soils varies from very shallow to deep depending on terrace height and proximity to the river channel. In Kuslinad soils, a water table perched on permafrost occurs at a very shallow or shallow depth. The soils range from very poorly drained to well drained.

Soils of minor extent: Hufman and Swedna

The very poorly drained Hufman soils formed in thick organic deposits along the margins of lakes and ponds in depressions and abandoned channels. The very poorly drained Swedna soils formed in stratified loamy over sandy and gravelly alluvium on low flood plains.

Dominant Vegetation

Flood plains:
Tall feltleaf willow scrub
Tall thinleaf alder scrub

Balsam poplar/thinleaf alder open forest
Balsam poplar-white spruce/thinleaf alder open forest
White spruce/thinleaf alder open forest (highest and oldest flood plains)
Stream terraces:
White spruce/ericaceous shrub open forest
Spruce/shrub birch woodland

Vegetation notes:
Sedge wet meadow occurs in sloughs and abandoned channels and along the shores of lakes and ponds.

135A1.V4—Southern Loamy Flood Plains and Stream Terraces Landtype Association

(Figure 6; Plates 5, 6, and 10—upper photo)

Geographic Setting

Distribution: along the lower Main Stem south of the canyon and the mid and lower West Fork to Sourdough
Approximate extent: 8,771 acres (3,551 ha); 9.7 percent of the survey area

Principal Ecological Sites

Loamy flood plains
Loamy high flood plains, frozen
Stream terraces, frozen
Terraces, wet
Wet depressions (minor occurrence)
Escarpments (minor occurrence)

Principal Soil Map Units

FP3—Dackey-Klute, moderately wet, complex, occasionally flooded
FP31—Kluna, deep-Hogan-Kluna, frequently flooded, complex
FP32—Dackey-Hogan-Klute, moderately wet, complex
FP4—Dackey-Swedna, very poorly drained, complex
MK1—Hufman peat
ST2—Kuslinad-Pergelic Cryohemists, dry-Hufman complex, 0 to 14 percent slopes
ST21—Kuslinad peat
ST24—Kuslinad-Kuslinad, very wet, complex
ST24B—Kuslinad-Kuslinad, very wet-Kusdry complex
ST3—Dackey-Hogan complex, 0 to 4 percent slopes
ST5—Haggard peat, 0 to 4 percent slopes

Physiography

Landforms: flood plains and stream terraces and associated sloughs, oxbow lakes, and abandoned channels
Elevation: 1,850 to 2,200 feet (564 to 671 m)
Slope: 0 to 2 percent
River channel: moderately to highly sinuous; unconfined to occasionally confined
Channel gradient: 5 to 15 feet/mile (0.9 to 2.8 m/km) (*Ingram and Carrick 1983*)
Terrace height: less than 1 foot to 20 feet (less than 0 to 6.1 m) or more above the level of the channel

Flooding frequency: frequent to none

Physiography notes:
Prominent high bluffs and escarpments form an abrupt transition between the river corridor and uplands in many places.

Dominant Soils

Flood plains:
Kluna
Klute, moderately wet
Dackey
Hogan
Stream terraces:
Kuslinad

Soil notes:
Kluna; Klute, moderately wet; and Dackey soils formed in stratified loamy alluvium of varying thickness over gravelly and sandy alluvium. Hogan and Kuslinad soils formed in stratified loamy alluvium and are shallow to moderately deep over permafrost. Depth to seasonally high water table in Klute, Kluna, and Dackey soils varies from shallow to deep depending on terrace height and proximity to the channel. In Kuslinad soils, a water table occurs at very shallow or shallow depths and is perched on the permafrost. The soils range from very poorly drained to well drained.

Soils of minor extent: Hufman, Haggard, and Kusdry

The very poorly drained Hufman soils formed in thick organic deposits over loamy alluvium along the margins of lakes and ponds in depressions and abandoned channels. The very poorly drained Haggard soils on stream terraces formed in thick organic deposits and are shallow or moderately deep over permafrost. The somewhat poorly drained Kusdry soils formed in stratified loamy over sandy and gravelly alluvium on stream terraces.

Dominant Vegetation

Flood plains:
Tall feltleaf willow scrub
Tall thinleaf alder scrub
Balsam poplar/thinleaf alder open forest
Balsam poplar-white spruce/thinleaf alder open forest
White spruce/thinleaf alder open forest (highest and oldest flood plains)
Stream terraces:
Spruce/shrub birch woodland
Black spruce/closed sheath cottongrass woodland
White spruce/ericaceous shrub open forest

Vegetation notes:
Sedge wet meadow occurs in sloughs and abandoned channels and along the shores of ponds and lakes.

135A1.V5—Lower Middle Fork Flood Plains and Stream Terraces Landtype Association

(Figure 7; Plate 4)

Geographic Setting

Distribution: along the lower Middle Fork and the Main Stem for about one mile (1.6 km) below the Middle Fork confluence
Approximate extent: 2,107 acres (853 ha); 2.5 percent of the survey area

Principal Ecological Sites

Loamy high flood plains
Loamy flood plains, moderately wet
Stream terraces, frozen
Stream terraces
Wet depressions (minor occurrence)
Peat mounds (minor occurrence)

Principal Soil Map Units

FP23—Hogan, cool-Sankluna complex, 0 to 15 percent slopes
MK1—Hufman peat
ST21—Kuslinad peat
ST22—Kuslinad-Ganhona complex, 0 to 20 percent slopes

Physiography

Landforms: narrow, high flood plains and broad, dissected stream terraces
Elevation: about 2,475 feet (754 m); elevation difference between the upper and lower ends of this unit —less than 100 feet (less than 30 m)
Slope: 0 to 20 percent
River channel: highly sinuous with well developed point bars on the insides of meanders; occasionally confined
Channel gradient: about 1 foot/mile (0.2 m/km) (*Ingram and Carrick 1983*)
Terrace height: 3 to 10 feet (1.0 to 3.1 m) or more with a narrow, steep, abrupt bank bordering much of the channel; 10 to 25 feet (3 to 7.6 m) on dissected terraces
Flooding frequency: frequent to none

Physiography notes:
Ponds and oxbow lakes in depressions and abandoned channels are extensive throughout the dissected terraces. Local relief between the terrace surfaces and the depressions ranges from 5 to 25 feet (1.5 to 7.6 m).

Dominant Soils

Flood plains:
Sankluna
Hogan, cool
Stream terraces:
Ganhona

Soil notes:
All soils formed in thick deposits of stratified sandy and loamy alluvium. Hogan, cool, and Kuslinad are very shallow to moderately deep over permafrost. Hogan, cool, and

Ganhona are well drained; Sankluna soils are moderately well drained with a deep water table; and Kuslinad soils are very poorly to poorly drained with a water table perched on the permafrost.

Soils of minor extent: Aquatna, Hufman, and Pergelic Cryohemists

The very poorly drained Aquatna soils formed in stratified loamy alluvium on steep river banks. The very poorly drained Hufman soils formed in thick organic deposits along the margins of lakes and ponds in depressions and abandoned channels. The very poorly drained to poorly drained Pergelic Cryohemists formed in thick organic deposits underlain by permafrost on stream terraces.

Dominant Vegetation

Flood plains:
Low willow/herb2 scrub
White spruce/willow open forest
Stream terraces:
Spruce/shrub birch woodland
Low shrub birch scrub

Vegetation notes:
Sedge-grass riparian meadow occurs on the edges of river banks adjacent to the channel, and Sedge wet meadow is present along the margins of lakes and ponds.

135A1.V6—Gravelly and Loamy Alluvial Fans and Fan Terraces Landtype Association

(Figure 8; Plate 1)

Geographic Setting

Distribution: upper and middle reaches of the Middle Fork
Approximate extent: 710 acres (287 ha); 0.9 percent of the survey area

Principal Ecological Sites

Gravelly and sandy terraces
Loamy high flood plains (minor occurrence)

Principal Soil Map Units

AF1—Pippod-Clarena complex, 2 to 10 percent slopes
ST13—Tangoe, occasionally flooded-Klute, occasionally flooded, complex, 2 to 7 percent slopes

Physiography

Landforms: cone shaped alluvial fans and fan terraces
Elevation: 2,450 to 2,700 feet (747 to 823 m)
Slope: 2 to 10 percent

Physiography notes:
The alluvial fan portion of this complex consists of high gradient flood plains along low volume streams, abandoned channels, and flood plain splays. The fan terrace portion

consists of stable interfluves or terraces between active stream channels. The fans and terraces, which are bounded along their upper edges by moderately high escarpments, issue from small creeks or streams, which have cut deep gullies through the escarpments. Poorly defined flood plains border the creek or stream where it crosses the fans.

Dominant Soils

Fan terraces:
Clarena
Pippod
Alluvial fans:
Tangoe
Klute, cool

Soil notes:
All soils formed in stratified loamy alluvium of varying thickness over gravelly alluvium. Pippod and Clarena soils, which are not flooded, have a thin mantle of loess on the surface. Tangoe and Klute soils are occasionally flooded. Tangoe soils have moderately deep water tables and are somewhat poorly drained. Clarena and Pippod soils are well drained to somewhat excessively drained.

Soils of minor extent: Cryaquepts and Hufman

The very poorly to poorly drained Cryaquepts formed in variable texture alluvium on alluvial fan aprons and lack permafrost. The very poorly drained Hufman soils formed in thick organic deposits along pond margins in depressions.

Dominant Vegetation

Outer margins of alluvial fans and fan terraces:
Spruce/shrub birch woodland
Low shrub birch scrub
Flood plains on fans:
White spruce/willow forest

Vegetation notes:
Evidence of recent wildfires is visible in most stands on fan terraces. On flood plains, tree height and apparent productivity decreases markedly with increasing distance from the creek or streambed.

135A1.V7—South Branch Deep Loamy Flood Plains and Stream Terraces Landtype Association

(Figure 9)

Geographic Setting

Distribution: narrow riparian zone along the upper South Branch for about 4 miles (6.4 km) below Mud Lake
Approximate extent: 325 acres (132 ha); 0.5 percent of the survey area

Principal Ecological Sites

Loamy riverbanks
Stream terraces, frozen

Terraces, wet
Loamy flood plains, moderately wet
Loamy high flood plains

Principal Soil Map Units

FP6—Aquatna, frequently flooded-Hogan, cool, complex
ST24—Kuslinad-Kuslinad, very wet, complex
ST31—Dackey, cool-Hogan, cool, complex, 0 to 4 percent slopes

Physiography

Landforms: flood plains and stream terraces
Elevation: 2,350 to 2,425 feet (716 to 739 m)
Slope: 0 to 2 percent
River channel: moderately to highly sinuous; confined by glaciolacustrine uplands
Channel gradient: about 2 feet/mile (0.4 m/km) (*Ingram and Carrick 1983*)
Terrace height: less than 1 to about 4 feet (less than 0.3 to about 1.2 m) above the level of the channel
Flooding frequency: frequent to none

Dominant Soils

Flood plains:
Aquatna
Hogan, cool
Stream terraces:
Kuslinad

Soil notes:
All soils formed in thick deposits of stratified loamy alluvium. Aquatna soils occur adjacent to the channel, have a water table at very shallow to shallow depth, and are very poorly drained. Hogan and Kuslinad are very shallow to moderately deep over permafrost. Kuslinad soils have a water table perched on the permafrost and are very poorly to poorly drained.

Soils of minor extent: Hufman

The very poorly drained Hufman soils formed in thick organic deposits along the margins of lakes and ponds in depressions and abandoned channels.

Dominant Vegetation

Flood plains:
Sedge-grass riparian meadow
Low willow/herb scrub
Stream terraces:
Spruce/shrub birch woodland
Black spruce/closed sheath cottongrass woodland

Vegetation notes:
Depending on terrace height, depth to water table, and duration of flooding, sedge-grass riparian meadows vary from nearly pure stands of *Carex aquatilis* and other tall sedges to nearly pure stands of *Calamagrostis canadensis*.

135A2—Glaciolacustrine Terraces and Hills Subsection

This Subsection includes the gently sloping to moderately steep glaciolacustrine terraces and hills above the Gulkana River corridor. North of the North Branch and West Fork, the Glaciofluvial Plains and Hills Subsection and Low Mountains Subsection bound this Subsection at upper elevations. To the south, the Glaciolacustrine Terraces and Hills Subsection continues for many miles.

Soils formed in medium and fine textured glaciolacustrine materials, which were deposited in an extensive proglacial lake that covered much of the Copper River Basin during the late Pleistocene (*Ferrians, Nichols, and Williams 1983*). Loamy lacustrine near-shore deposits are common above about 2,000 feet (610 m) elevation. At lower elevations, lacustrine deposits are generally clayey and often calcareous. Coarse textured outwash and strandline deposits and deep organic deposits occur in scattered locations throughout this Subsection. Discontinuous, shallow to moderately deep permafrost is common in clayey and loamy soils and in many areas of organic soils. Permafrost is generally absent in coarse textured soils and in areas impacted by wildfires. Potential vegetation is primarily boreal spruce woodland with wet meadows and scrub in bogs and depressions.

Extent within the Gulkana River area: 60,471 acres (24,482 ha); 65.7 percent of the survey area

Major Geomorphic and Soil Processes

Most of the soils in this Subsection are underlain by shallow permafrost, and large areas of these soils cycle between a poorly drained, permafrost rich condition and a well drained, permafrost free state. Wildfires are common in spruce (*Picea spp*) woodland and initiate change by disturbing the insulating organic mat and encouraging melting and subsidence of permafrost and lowering of the associated perched water table. Return to the pre-burn state is likely as post-fire vegetation succession progresses and the organic mat reestablishes. Specific soil processes are associated with each part of this cycle.

In areas recently impacted by fire, *alkalinization* occurs as a result of the incineration of the organic mat and deposition of nutrient rich ash on the soil surface. In years following fire, a gradual *acidification*—removal of soil bases from surface layers by downward percolation of precipitation—occurs and is often associated with reestablishment and thickening of the organic mat. Over time, this mat becomes thick enough to insulate soils and prevent the annual frost layer from melting during summer. Permafrost forms, and *hydromorphism*—a process associated with saturated soil conditions— and c*ryoturbation*—the churning of soil layers by frost action—occur within the annual thaw zone above the permafrost.

Somewhat excessively drained soils, formed in sandy and gravelly glaciofluvial deposits, are scattered throughout this Subsection. Processes associated with these soils include *acidification* (previously described) and *alteration and translocation of soil minerals*—the weathering and downward translocation of soil minerals in the soil profile.

A more detailed description of soil and geomorphic processes is included in Appendix B.

Vegetation Patterns

Recurring wildfires have burned extensive areas of this Subsection, impacting soil and site properties, vegetation succession, and associated vegetation patterns. Glaciolacustrine terraces that have remained unburned for an extended period typically

have shallow permafrost, restricted soil drainage, and stunted, low productivity woodland dominated by *Picea mariana* and *P. glauca*. In recently burned areas, permafrost is usually absent and the well drained soils support more productive scrub and young *Picea* woodland. Landform, soils, and vegetation patterns in this Subsection are represented in Figures 10, 11, 12, and 13.

Following wildfires, long-term vegetation succession typically leads to a thick and highly insulating moss and organic mat on the soil surface. This mat helps maintain low soil temperatures throughout the year and promotes the development of permafrost within the soil profile. Nutrient mineralization, availability, and cycling become progressively reduced with advancing succession. Site productivity also decreases.

135A2.U1—Loamy Glaciolacustrine Uplands Landtype Association

(Figure 10; Plates 8—upper photo, 9, and 10—lower photo)

Geographic Setting

Distribution: throughout the area except above the lower Main Stem and West Fork and upper South Branch.
Approximate extent: 36,395 acres (14,734 ha); 40.3 percent of the survey area—the most extensive Landtype Association in the area

Principal Ecological Sites

Glaciolacustrine uplands, frozen
Glaciolacustrine uplands
Shallow drainages
Terraces, wet (minor occurrence)
Gravelly and sandy terraces (minor occurrence)
Wet depressions (minor occurrence)

Principal Soil Map Units

AT1—Chistna and Pippod soils, 0 to 14 percent slopes
LL1—Mendna and Chelina soils, 0 to 10 percent slopes
LL12—Chelina loam, 0 to 10 percent slopes
LL2—Mendna-Ewan complex, 0 to 6 percent slopes
LL41—Pergelic Cryohemists, dry-Cryofibrists complex, 0 to 14 percent slopes
LL411—Pergelic Cryohemists-Mendna, very wet-Cryofibrists complex, 0 to 14 percent slopes
MK2—Pergelic Cryohemists and Cryofibrists soils
TS1—Cryaquepts, 4 to 25 percent slopes

Physiography

Landforms: glaciolacustrine terraces and hills and terrace escarpments; small, isolated areas of glacial outwash plains and strandlines in scattered locations
Elevation: 2,000 to 3,050 feet (610 to 930 m)
Slope: 0 to 20 percent

Physiography notes:
Permafrost is discontinuous throughout this unit.

Dominant Soils

Mendna
Chelina
Pergelic Cryohemists
Cryofibrists

Soil notes:
Mendna and Chelina soils formed in loamy glaciolacustrine deposits. The very poorly to poorly drained Mendna soils have a moderately thick surface organic mat and are very shallow to moderately deep over permafrost. The well drained Chelina soils have a thin organic mat and lack permafrost. Pergelic Cryohemists and Cryofibrists formed in thick organic materials in bogs, depressions, and drainages. These soils are underlain by discontinuous permafrost and are very poorly drained.

Soils of minor extent: Ewan, Cryaquepts, Cryochrepts, Cryorthents, Pippod, and Chistna

The very poorly drained Ewan soils formed in loamy glaciolacustrine deposits in drainages and lack permafrost. The very poorly to poorly drained Cryaquepts soils formed in variable texture materials on toeslopes of hills and escarpments and have intermittent permafrost. The well drained Cryochrepts and Cryorthents formed in variable texture material on escarpments and have intermittent permafrost. The somewhat excessively drained Pippod and well drained Chistna soils are on strandlines and outwash plains and lack permafrost.

Dominant Vegetation

Glaciolacustrine terraces and hills:
Spruce/spruce muskeg sedge open forest
Spruce/shrub birch woodland
Black spruce/closed sheath cottongrass woodland
Low shrub birch scrub (recently burned areas)
Outwash plains and strandline deposits:
Spruce/shrub birch woodland
Spruce/lichen woodland
Quaking aspen-white spruce forest

Vegetation notes:
Organic soils in bogs, depressions, and drainages support Black spruce/closed sheath cottongrass woodland, Low shrub birch-willow/water sedge scrub, and Sedge wet meadow.

135A2.U2—Clayey Glaciolacustrine Uplands Landtype Association

(Figure 11; Plates 7—lower photo and 8—lower photo)

Geographic Setting

Distribution: above the lower reaches of the Main Stem and West Fork to Sourdough
Approximate extent: 15,863 acres (6,422 ha); 17.3 percent of the survey area

Principal Ecological Sites

Glaciolacustrine uplands
Glaciolacustrine uplands, frozen
Terraces, wet
Wet depressions

Principal Soil Map Units

AT1—Chistna and Pippod soils, 0 to 14 percent slopes
LC1—Klasi peat, 0 to 10 percent slopes
LC2—Gadona silty clay, 0 to 10 percent slopes
LC5—Klasi-Klasi, very wet, complex, 0 to 12 percent slopes
MK2—Pergelic Cryohemists and Cryofibrists soils
TS14—Cryaquepts and Cryaquepts, very wet, soils, 4 to 25 percent slopes

Physiography

Landforms: glaciolacustrine terraces and hills and terrace escarpments immediately adjacent to the Gulkana River corridor; small, isolated areas of glacial outwash plains and strandlines in scattered locations
Elevation: 1,900 to 2,200 feet (579 to 671 m)
Slope: mostly 0 to 14 percent, occasionally to 25 percent

Physiography notes:
Permafrost is discontinuous throughout this unit.

Dominant Soils

Klasi
Gadona
Pergelic Cryohemists
Cryofibrists

Soil notes:
Klasi and Gadona soils formed in clayey glaciolacustrine deposits. Klasi soils have a moderately thick surface organic mat, are shallow to moderately deep over permafrost, and are very poorly drained. Gadona soils have only a thin organic mat, lack permafrost, and are well drained. Pergelic Cryohemists and Cryofibrists formed in organic materials in bogs, depressions, and drainages. These soils are very poorly to poorly drained.

Soils of minor extent: Chistna, Cryaquepts, Cryorthents, Cryochrepts, and Pippod

The well drained Chistna and somewhat excessively drained Pippod soils formed in sandy and gravelly glaciofluvial deposits on strandlines and outwash plains and lack permafrost. The well drained Cryochrepts and Cryorthents formed in variable texture materials on escarpments and have intermittent permafrost. The very poorly drained Cryaquepts formed in variable texture materials on toeslopes of hills and escarpments and have intermittent permafrost.

Dominant Vegetation

Glaciolacustrine terraces and hills:
Spruce/spruce muskeg sedge open forest
Spruce/shrub birch woodland
Black spruce/closed sheath cottongrass woodland
Low shrub birch scrub (recently burned areas)
Outwash plains and strandline deposits:
Spruce/shrub birch woodland
Spruce/lichen woodland
Quaking aspen-white spruce forest

Vegetation notes:
Organic soils support Black spruce/closed sheath cottongrass woodland, Low shrub birch-willow/water sedge scrub, and Sedge wet meadow.

135A2.U3—Ruptic Glaciolacustrine Uplands Landtype Association

(Figure 12; Plate 7—upper photo)

Geographic Setting

Distribution: above the upper reaches of the South Branch
Approximate extent: 4,226 acres (1710 ha); 6.2 percent of the survey area

Principal Ecological Sites

Glaciolacustrine uplands, ruptic
Glaciolacustrine uplands, frozen
Terraces, wet
Peat mounds (minor occurrence)
Wet depressions (minor occurrence)

Principal Soil Map Units

LC5—Klasi-Klasi, very wet, complex, 0 to 12 percent slopes
LC6—Swillna, thin surface-Swillna complex, 0 to 15 percent slopes
LL41—Pergelic Cryohemists, dry-Cryofibrists complex, 0 to 14 percent slopes

Physiography

Landforms: glaciolacustrine terraces and low hills
Elevation: 2,450 to 2,525 feet (747 to 770 m)
Slope: 0 to 15 percent

Physiography notes:
Extensive areas on terraces have frost boils with summits about 1 foot (0.3 m) high and intermound spacing of 10 to 12 feet (3.0 to 3.7 m). Frost boils are the result of ice lens formation and frost heaving in saturated, fine textured materials. Permafrost is discontinuous throughout this unit.

Dominant Soils

Klasi
Swillna
Pergelic Cryohemists
Cryofibrists

Soil notes:
Klasi soils occur on plain and convex positions on terraces throughout this Subsection. Swillna and Swillna, thin surface, soils occur in areas of frost boils, with Swillna soils occupying the intermound depressions and Swillna, thin surface, on the mound summits. Klasi and Swillna soils formed in silty and clayey glaciolacustrine deposits, have a moderately thick surface organic mat, are very shallow to moderately deep over permafrost, and have a water table at very shallow or shallow depths. Swillna, thin surface, soils also formed in silty and clayey deposits but have only a thin organic mat and are moderately deep over permafrost. All soils are poorly or very poorly drained.

Pergelic Cryohemists, dry, soils occur on ice cored mounds and palsen. Cryofibrists soils occur in depressions and along pond fringes. Pergelic Cryohemists and Cryofibrists soils formed in thick organic materials, have discontinuous permafrost, and are poorly or very poorly drained.

Soils of minor extent: Cryochrepts, Cryorthents, and Cryaquepts

The well drained Cryochrepts and Cryorthents soils formed in variable texture materials, occur on escarpments, and have intermittent permafrost. The very poorly to poorly drained Cryaquepts soils formed in variable texture material, occur on toeslopes of hills and escarpments, and have intermittent permafrost.

Dominant Vegetation

Glaciolacustrine terraces and hills:
Black spruce/closed sheath cottongrass woodland
Spruce/spruce muskeg sedge open forest
Spruce/shrub birch woodland.

Vegetation notes:
Vegetation cover on the summits of frost mounds is often sparse with common areas of bare soil. Localized areas of peat mounds and intervening depressions support Low shrub birch scrub and Sedge wet meadow.

135A2.U4—Loamy Depressional Glaciolacustrine Uplands Landtype Association

(Figure 13; Plate 10—lower photo)

Geographic Setting

Distribution: limited occurrence along the upper North Branch
Approximate extent: 2,726 acres (1104 ha); 2.9 percent of the survey area

Principal Ecological Sites

Peat mounds
Terraces, wet
Wet depressions

Principal Soil Map Units

LL41—Pergelic Cryohemists, dry-Cryofibrists complex, 0 to 14 percent slopes
LL411—Pergelic Cryohemists-Mendna, very wet-Cryofibrists complex, 0 to 14 percent slopes

Physiography

Landforms: glaciolacustrine terraces with multiple ice-cored peat mounds, depressions, and shallow drainages
Elevation: 2,550 to 2,650 feet (777 to 808 m)
Slope: 0 to 15 percent

Physiography notes:

Local relief between the terraces, mounds, and depressions is 5 to 15 feet (1.5 to 4.6 m) or more. Ponds fill many of the depressions.

Dominant Soils

Mendna
Pergelic Cryohemists, dry
Cryofibrists

Soils notes:

Mendna soils formed in loamy glaciolacustrine deposits, have a moderately thick surface organic mat, and are very shallow to moderately deep over permafrost. Pergelic Cryohemists, dry, and Cryofibrists formed in thick organic deposits. Pergelic Cryohemists, dry, occur on peat mounds and in drainages and have shallow, ice-rich permafrost and a shallow water table. Cryohemists occur in depressions and along pond margins, have a very shallow to ponded water table, and lack permafrost. All soils are very poorly drained.

Soils of minor extent: Cryochrepts and Cryorthents

These soils formed in variable texture materials on escarpments, have intermittent permafrost, and are well drained.

Dominant Vegetation

Glaciolacustrine terraces:
Black spruce/closed sheath cottongrass woodland (concave microsites)
Spruce/shrub birch woodland (convex microsites)
Peat mounds:
Low shrub birch scrub
Spruce/shrub birch woodland
Drainages:
Black spruce/closed sheath cottongrass woodland
Spruce/water sedge woodland
Low shrub birch-willow/water sedge scrub
Depressions and pond margins:
Sedge wet meadow

135A3—Glaciofluvial Plains and Hills Subsection

This Subsection includes the pitted glacial outwash plains and hills in the uplands at the upper end of the Middle Fork and for many miles to the north and west of the survey area. Soils formed in a thin layer of silty loess over deep deposits of glacial drift. The glacial drift, which is primarily sandy and gravelly glacial outwash, was deposited above about 2,600 feet (792 m) elevation by glaciers from surrounding mountains during the Pleistocene. Permafrost is generally absent. Potential vegetation is primarily shrub birch scrub with willow scrub and sedge-grass meadows in drainages.

Extent within the Gulkana River area: 1,895 acres (767 ha); 2.1 percent of the survey area

Major Geomorphic and Soil Processes

Most soils in this Subsection are somewhat excessively drained and formed in porous

sandy and gravelly outwash. Major processes include *acidification*—the removal of soil bases from surface layers by plant use and percolation of precipitation— and *alteration and translocation of soil minerals*—the weathering and downward translocation of soil minerals in the soil profile.

A more detailed description of soil and geomorphic processes is included in Appendix B.

Vegetation Patterns

The rolling topography and coarse textured soil materials in this Subsection result in marked differences in the vegetation, depending on slope position. All soils have low water holding capacity, which in conjunction with relatively low summer precipitation, results in xeric growing conditions. The dry conditions are particularly evident on crests and shoulders of hills and other convex slopes, where vegetation is sparse and gravelly and cobbly outwash is exposed at the surface in many places. Sandy blowouts also are barren of vegetation. Shrub birch scrub occurs on backslopes and lower slopes. Fruticose lichens, patches of moss, and herbs characteristic of dry sites usually dominate the ground layer. This Subsection generally occurs above treeline in the Gulkana River survey area, although spruce woodland is at lower elevations. Landforms, soils, and vegetation patterns in this Subsection are represented in Figure 14.

Because of the generally sparse vegetation, particularly on the ground surface, this Subsection is only moderately susceptible to burning. Post-fire succession leads almost directly to vegetation similar to the pre-burn condition.

135A3.G1—Gravelly and Sandy Glaciofluvial Uplands Landtype Association

(Figure 14; Plate 12—upper photo)

Geographic Setting

Distribution: limited to the uplands in the vicinity of Dickey Lake on the Middle Fork
Approximate extent: 1,688 acres (683 ha); 1.8 percent of the survey area

Principal Ecological Sites

Gravelly and sandy hills

Principal Soil Map Units

GO1—Pippod and Chistna soils, high elevation, 0 to 30 percent slopes

Physiography

Landforms: pitted glacial outwash plains and hills
Elevation: 2,750 to 3,000 feet (838 to 914 m)
Slope: 0 to 30 percent

Physiography notes:
Local relief ranges from 5 to 100 feet (1.5 to 33 m) or more.

Dominant Soils

Pippod, high elevation
Chistna, high elevation

Soil notes:
Pippod, high elevation, and Chistna, high elevation, are somewhat excessively drained and well drained soils formed in a thin mantle of silty loess over gravelly and sandy glacial outwash. On the summits of hills and other convex microsites, soils are sandy and gravelly to the surface. Sandy blowouts are common in many places. The water holding capacity of these soils is low.

Soils of minor extent: Cryochrepts and Cryorthents

These well drained to excessively drained soils formed in sandy and gravelly material on escarpments and lack permafrost.

Dominant Vegetation

Low shrub birch scrub
Low shrub birch/lichen scrub
Spruce/shrub birch woodland (moist microsites at lower elevations)
Low willow/herb scrub (flood plains and other drainages)

135A4—Low Mountains Subsection

This Subsection consists of rounded, bedrock-cored mountains at mid elevations within the Copper River Basin. At lower elevations, where this Subsection adjoins the Glaciolacustrine Terraces and Hills Subsection, gravelly glacial till and loamy lacustrine near-shore deposits from Pleistocene glaciations mantle most of the landscape. Bedrock colluvium and rock outcrops are intermixed in these glacial deposits on steeper mountain footslopes.

In the Gulkana River area, this Subsection occurs in scattered locations along the lower Middle Fork and upper Main Stem. Elsewhere in the Copper River Basin, the Low Mountains Subsection is extensive.

Soils formed in silty loess, loamy glaciolacustrine deposits, loamy glacial till, and bedrock residuum. Unconsolidated bedrock is very shallow to shallow on upper mountain slopes and very deep on lower slopes. Permafrost is discontinuous and generally confined to lower elevation glaciolacustrine footslopes. Potential vegetation is boreal spruce woodland. In the Gulkana River area, most of the woodland cover of this Subsection was destroyed by wildfire. Potential vegetation at higher elevations is various subalpine and alpine scrub and dwarf scrub communities.

Extent within the Gulkana River area: 7,689 acres (2,150 ha); 8.4 percent of the survey area

Major Geomorphic and Soil Processes

Lower mountain slopes:
Most of the soils in this part of the Subsection are underlain by shallow permafrost, and large areas of these soils cycle between a poorly drained, permafrost rich condition and a well drained, permafrost free state. Wildfires are common in spruce (*Picea spp*) woodland and initiate change by disturbing the insulating organic mat and encouraging melting and

subsidence of permafrost and lowering of the associated perched water table. Return to the pre-burn state is likely as post-fire vegetation succession progresses and the organic mat reestablishes. Specific soil processes are associated with each part of this cycle.

In areas recently impacted by fire, *alkalinization* occurs as a result of the incineration of the organic mat and deposition of nutrient rich ash on the soil surface. In years following fire, a gradual *acidification*—removal of soil bases from surface layers by downward percolation of precipitation—occurs and is often associated with reestablishment and thickening of the organic mat. Over time, this mat becomes thick enough to insulate soils and prevent the annual frost layer from melting during summer. Permafrost forms, and *hydromorphism*—a process associated with saturated soil conditions—and *cryoturbation*—the churning of soil layers by frost action—occur within the annual thaw zone above the permafrost.

Upper Mountain Slopes:
Important processes on upper mountain slopes include *acidification* (described above), *alteration* and *translocation*—the downward percolation of mobilized soil minerals in the soil solution, and *colluvial processes*. *Colluvial processes* include transportation and/or deposition by direct gravitational action and are primarily associated with areas of steep slopes within this Subsection.

A more detailed description of soil and geomorphic processes is included in Appendix B.

Vegetation Patterns

This Subsection extends from the upper limits of tree growth into the subalpine. However, due to the widespread occurrence of past wildfires, treeline is not readily apparent. In most places, the scrub vegetation is dominated by *Betula glandulosa*. Except at the highest elevations, the common occurrence of *Picea glauca* seedlings and small trees, relic trees, and snags and charred downfall indicates that most of this Subsection within the Gulkana River area is below treeline with Spruce woodland potential. On upper mountain slopes, vegetation potential is low; dwarf alpine scrub and herbaceous and cryptogam vegetation are the dominant plant life. Landforms, soils, and vegetation patterns in this Subsection are represented in Figure 15.

135A4.M1—Northern Low Mountains Landtype Association

(Figure 15; Plate 12—lower photo)

Geographic Setting

Distribution: primarily above the lower Middle Fork and Main Stem-Middle Fork confluence and in scattered locations above the Main Stem canyon
Approximate extent: 7,689 acres (3,113 ha); 8.4 percent of the survey area

Principal Ecological Sites

Upper mountain slopes, shallow
Mountain slopes, shallow
Loamy backslopes (minor occurrence)
Glaciolacustrine uplands, frozen (minor occurrence)
Glaciolacustrine uplands (minor occurrence)

Principal Soil Map Units

AL1—Cobblank, cool-Rock outcrop complex, 0 to 30 percent slopes
AL2—Cobblank and Telay soils, 2 to 16 percent slopes
BR1—Cobblank silt loam, 5 to 25 percent slopes
LL1—Mendna and Chelina soils, 0 to 10 percent slopes
SA1—Nickolna silt loam, 4 to 16 percent slopes
SA3—Goodview-Rock outcrop complex, 20 to 50 percent slopes
TS12—Chelina and Mendna soils, 6 to 20 percent slopes

Physiography

Landforms: low mountains
Elevation: 2,350 to 3,700 feet (716 to 1128 m)
Slope: 4 to 50 percent

Physiography notes:
In most places, the landscape is smeared with various glaciolacustrine and glacial drift deposits. The underlying bedrock controls the shape and character of the landscape. Bedrock outcrops are common at higher elevations and on steep slopes.

Dominant Soils

Mountain backslopes, shoulders, and summits:
Telay
Cobblank
Goodview
Nickolna
Mountain footslope:
Mendna
Chelina

Soil notes:
Telay, Cobblank, and Goodview soils formed in a thin layer of silty loess over loamy glacial till. Cobblank and Goodview soils are shallow to very shallow over unconsolidated bedrock. Nickolna soils, which occupy the transition zone between the bedrock controlled mountain slopes and the lower glaciolacustrine deposits, are deep soils formed in loess over mixed glaciolacustrine deposits and colluvium. These soils are all well drained. Mendna and Chelina soils formed in loamy glaciolacustrine deposits.

Mendna soils are very poorly to poorly drained and very shallow to moderately deep over permafrost. Chelina soils are well drained and lack permafrost.

Dominant Vegetation

Spruce/shrub birch woodland
Low shrub birch scrub
Tall green alder scrub
Spruce/alder woodland

Vegetation notes:
Wildfires have destroyed most of the woodland cover, although scattered small spruce, saplings, and seedlings are common throughout the scrub vegetation. Tall green alder scrub and Spruce/alder woodland are generally restricted to the glaciolacustrine terrace-bedrock upland transition zone on Nickolna soils. These types, together with Spruce/shrub

birch woodland and Low shrub birch scrub, form a prominent band on mid mountain slopes at lower elevations in this Landtype Association.

SOIL RESOURCES

Delineations on the soil map in Volume 2 represent the soil map units of the Gulkana River area. Survey methods used to make this map are described in Appendix C. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses, and to plan the management needed for those uses. More information about each map unit is provided in the section "Use and Management of the Soils."

Each delineation on the detailed soil maps has a *map unit symbol* to indicate the map unit and to link it to the corresponding map unit description on the following pages. Each delineation on the map represents an area on the landscape and consists of one or more soils or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, on-site investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Kuslinad, very wet, is a phase of the Kuslinad series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, consociations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. AF1—Pippod-Clarena complex, 2 to 10 percent slopes, is an example.

In a *consociation,* delineated areas are dominated by a single soil taxon (or miscellaneous area) and similar soils. As a rule, at least one half of the pedons in each delineation of a soil consociation are of the same taxonomic unit and provide the name for the map unit. MK1—Hufman peat is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. TS12—Chelina and Mendna soils, 6 to 20 percent slopes, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Table 5 lists the one to three most frequently occurring vegetation cover types found on each map unit component. Table 6 lists the ecological site correlated to each map unit component. Other tables ("Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Soil Map Unit Descriptions

Appendix D gives the description of the soils, Appendix E gives the description of vegetation cover types, and Appendix F gives the detailed descriptions of ecological sites listed in the following map unit descriptions.

AF1—Pippod-Clarena complex, 2 to 10 percent slopes

(Figure 8; Plate 1—upper photo)

Setting

Location: uplands in the northern portion of the area—Landtype Association Map Unit 135A1.V6
Elevation: 2,450 to 2,700 feet (747 to 823 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)

Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This unit is dissected by ephemeral stream channels 8 to 12 feet (2.4 to 3.7 m) deep. Permafrost is generally absent from this unit.

Composition

Major components:
Pippod and similar soils: 45 to 70 percent
Clarena and similar soils: 20 to 45 percent
Minor components:
Tangoe soils along stream channels: 0 to 5 percent
Aquatna soils on fan aprons: 0 to 5 percent
Klute soils along stream channels: 0 to 5 percent

Major Component Description

Pippod
Landforms: fan terraces
Position on landforms: interfluves
Slope: 2 to 10 percent, plane
Slope length: 500 to 2,500 feet (152 to 762 m)
Depth class: very shallow—less than 10 inches (less than 25 cm) to sand and gravel
Drainage class: somewhat excessively drained
Dominant parent material: loess over alluvium
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 2.2 inches (5.6 cm)
Ecological site: Gravelly and sandy terraces (Spruce/lichen woodland)

Note:
Pippod soils have surface micro-relief of up to 10 inches (25 cm). Height above ephemeral channels ranges from 8 to 12 feet (2.4 to 3.7 m).

Representative pedon: about 2 inches (5 cm) of fibrous organic material over 8 inches (20 cm) of silty loess—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

Clarena
Landforms: fan terraces
Position on landforms: interfluves
Micro-relief: earth hummocks
Slope: 2 to 10 percent, plane
Slope length: 500 to 2,500 feet (152 to 762 m)
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: well drained
Dominant parent material: loess over alluvium
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 3.6 inches (9.1 cm)
Ecological site: Gravelly and sandy terraces (Spruce/lichen woodland)

Note:
Earth hummocks have micro-relief of up to 20 inches (up to 50 cm); spacing between hummocks ranges from 5 to 10 feet (1.5 to 3 m). Height above ephemeral channels ranges from 8 to 12 feet (2.4 to 3.7 m).

Representative pedon: about 4 inches (10 cm) of fibrous organic material over 3 inches (8 cm) of silty loess—below this, loamy alluvium 15 inches (38 cm) thick underlain by very gravelly and extremely gravelly coarse sand to 60 inches (152 cm) or more

AL1—Cobblank, cool-Rock outcrop complex, 0 to 30 percent slopes
(Figure 15)

Setting

Location: uplands in the northern portion of the area— Landtype Association Map Unit 135A4.M1
Elevation: 2,900 to 3,900 feet (884 to 1,189 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
Permafrost is generally absent from this unit.

Composition

Major components:
Cobblank, cool, and similar soils: 65 to 90 percent
Rock outcrop: 10 to 30 percent
Minor components:
Cryaquepts soils in depressions: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent

Major Component Description

Cobblank, cool
Landforms: hills and mountains
Position on landforms: shoulders and summits
Slope: 0 to 30 percent, plane or convex
Slope length: 300 to 1,200 feet (91 to 366 m)
Depth class: shallow—10 to 20 inches (25 to 51 cm) to unweathered bedrock
Drainage class: well drained
Dominant parent material: loess over gravelly till
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 2.5 inches (6.4 cm)
Ecological site: Upper mountain slopes, shallow (Low shrub birch scrub)

Representative pedon: about 1 inch (2.5 cm) of fibrous organic materials over 1 inch (2.5 cm) of silty loess, underlain by gravelly glacial till and colluvium to 18 inches (46 cm)—below this, consolidated bedrock.

Rock outcrop
Definition: exposures of unvegetated bedrock
Landforms: hills and mountains

Position on landforms: shoulders and summits
Slope: 0 to 30 percent

AL2—Cobblank and Telay soils, 2 to 16 percent slopes

Setting

Location: uplands in the northern portion of the area— Landtype Association Map Unit 135A4.M1
Elevation: 2,300 to 2,900 feet (701 to 884 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: undifferentiated group

Note:
Charred trees and stumps indicate that this unit is burned periodically by wildfire. Permafrost is generally absent.

Composition

Major components:
Cobblank and similar soils: 0 to 90 percent
Telay and similar soils: 0 to 90 percent
Minor components:
Ewan soils in drainages: 0 to 5 percent
Mendna soils on toeslopes: 0 to 5 percent
Bedrock outcrops: 0 to 5 percent

Major Component Description

Cobblank
Landforms: hills and mountains
Position on landforms: shoulders and summits
Slope: 2 to 16 percent, all shapes
Slope length: 300 to 1,200 feet (91 to 366 cm)
Depth class: shallow—10 to 20 inches (25 to 51 cm) to unweathered bedrock
Drainage class: well drained
Dominant parent material: loess over gravelly till
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 2.5 inches (6.4 cm)
Ecological site: Mountain slopes, shallow (Spruce/shrub birch woodland)

Representative pedon: about 1 inch (2.5 cm) of fibrous organic material over 1 inch (2.5 cm) of silty loess, underlain by gravelly and cobbly glacial till to 18 inches (46 cm)—below this, consolidated bedrock

Telay
Landforms: hills and mountains
Position on landforms: shoulders and summits
Slope: 2 to 16 percent, all shapes
Slope length: 300 to 1,200 feet (91 to 366 m)
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Dominant parent material: loess over till

Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 4.6 inches (12 cm)
Ecological site: Glaciolacustrine uplands (Spruce/shrub birch woodland)

Representative pedon: about 2 inches (5 cm) of fibrous organic material over 2 inches (5 cm) of silty loess—below this, very gravelly glacial till to 60 inches (152 cm) or more

AT1—Chistna and Pippod soils, 0 to 14 percent slopes

Setting

Location: uplands in the eastern and southeastern portion of the area—Landtype Association Map Units 135A2.U1 and 135A2.U2
Elevation: 1,900 to 2,600 feet (579 to 792 m)
Mean annual precipitation: 15 to 21 inches (38 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: undifferentiated group

Note:
This unit occurs on upper-most terrace positions adjacent to the river valleys. Permafrost is generally absent.

Composition

Major components:
Chistna and similar soils: 0 to 90 percent
Pippod and similar soils: 0 to 90 percent
Minor components:
Mendna soils on glaciolacustrine terraces: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent

Major Component Description

Chistna
Landforms: stream terraces and outwash plains
Position on landforms: all positions
Slope: 0 to 14 percent, all shapes
Slope length: 20 to 200 feet (6 to 61 m)
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: somewhat excessively drained
Dominant parent material: loess over sandy glaciofluvial deposits
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 3.2 inches (8 cm)
Ecological site: Gravelly and sandy terraces (Spruce/lichen woodland)

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 1 inch (3 cm) of silty loess—below this, loamy glacial outwash 3 inches (8 cm) thick over sandy glacial outwash to 60 inches (152 cm) or more

Pippod
Landforms: stream terraces and outwash plains
Position on landforms: all positions
Slope: 0 to 14 percent, all shapes

Slope length: 20 to 200 feet (6 to 61 m)
Depth class: very shallow—less than 10 inches (less than 25 cm) to sand and gravel
Drainage class: somewhat excessively drained
Dominant parent material: loess over gravelly glaciofluvial deposits
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 2.2 inches (5.6 cm)
Ecological site: Gravelly and sandy terraces (Spruce/lichen woodland)

Representative pedon: about 2 inches (5 cm) of fibrous organic material over 8 inches (20 cm) of silty loess—below this, sandy and gravelly glacial outwash to 60 inches (152 cm) or more

BR1—Cobblank silt loam, 5 to 25 percent slopes

Setting

Location: uplands in the northern portion of the area—Landtype Association Map Unit 135A4.M1
Elevation: 2,300 to 2,700 feet (701 to 823 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: consociation

Note:
Charred trees and stumps indicate that this unit is burned periodically by wildfire. Permafrost is generally absent.

Composition

Major components:
Cobblank and similar soils: 85 to 95 percent
Minor components:
Mendna soils on footslopes: 0 to 10 percent
Chelina and Telay soils on similar positions: 0 to 5 percent
Bedrock outcrops: 0 to 5 percent

Major Component Description

Landforms: hills and mountains
Position on landforms: backslopes and shoulders
Slope: 5 to 25 percent, all shapes
Slope length: 300 to 1,200 feet (91 to 366 m)
Depth class: shallow—10 to 20 inches (25 to 51 cm) to unweathered bedrock
Drainage class: well drained
Dominant parent material: loess over gravelly till
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 2.5 inches (6.4 cm)
Ecological site: Mountain slopes, shallow (Spruce/shrub birch woodland)

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 1 inch (3 cm) of silty loess, underlain by gravelly glacial till to 18 inches (46 cm)—below this, consolidated bedrock

ESC1—Cryorthents and Cryochrepts soils, 20 to 80 percent slopes

Setting

Location: uplands throughout the area—Landtype Association Map Units 135A2.U1, 135A2.U2, 135A2.U3, 135A2.U4, and 135A3.G1
Elevation: 1,850 to 2,900 feet (564 to 884 m)
Mean annual precipitation: 15 to 21 inches (38 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: undifferentiated group

Note:
This unit occurs on steep escarpments, which separate the river valleys from uplands. Permafrost is discontinuous.

Composition

Major components:
Cryorthents and similar soils: 0 to 90 percent
Cryochrepts and similar soils: 0 to 90 percent
Minor components:
Ewan soils in drainages: 0 to 5 percent
Slumps and barren ground: 0 to 5 percent
Bedrock outcrops: 0 to 5 percent

Major Component Description

Cryorthents
Landforms: escarpments
Position on landforms: backslopes, shoulders, and footslopes
Slope: 20 to 80 percent, plane
Slope length: 100 to 500 feet (30 to 152 m)
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained to somewhat excessively drained
Dominant parent material: colluvium
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 6.8 inches (17.3 cm)
Ecological site: Escarpments

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 1 inch (3 cm) of loamy material of mixed origin—below this, variable loamy and gravelly material of mixed origin to 60 inches (152 cm) or more

Cryochrepts
Landforms: escarpments
Position on landforms: backslopes, shoulders, and footslopes
Slope: 20 to 80 percent, plane
Slope length: 100 to 500 feet (30 to 152 m)
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained to somewhat excessively drained
Dominant parent material: colluvium
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 6.6 inches (16.8 cm)
Ecological site: Escarpments

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 1 inch (3 cm) of loamy surface material of mixed origin—below this, variable texture loamy and gravelly material of mixed origin to 60 inches (152 cm) or more

FP1—Tangoe sandy loam, frequently flooded

(Figure 3)

Setting

Location: along the Main Stem from Paxson Lake to the confluence of the Middle Fork—Landtype Association Map Unit 135A1.V1
Elevation: 2,450 to 2,600 feet (747 to 792 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: consociation

Note:

This riparian unit occurs along straight river channels; channel gradient is about 38 feet/mile (7.2 m/km).

Composition

Major components:
Tangoe and similar soils: 80 to 95 percent
Minor components:
Gravelly alluvial areas: 0 to 5 percent
Tangoe, wet, soils in channels and depressions: 0 to 5 percent
Klute soils on forested terraces: 0 to 5 percent
Tangoe, occasionally flooded, soils: 0 to 5 percent

Major Component Description

Landforms: flood plains
Position on landforms: low flood plain positions
Slope: 0 to 2 percent, plane
Depth class: very shallow—less than 10 inches (less than 25 cm) to sand and gravel
Drainage class: somewhat poorly drained
Dominant parent material: gravelly alluvium
Flooding: frequent
Depth to seasonally high water table: 1.5 to 3 feet (0.5 to 0.9 m)
Available water capacity: mainly 2 inches (5 cm)
Ecological site: Gravelly flood plains, moderately wet (Low willow/herb scrub)

Note:

Terrace height above the mean summer channel level is 2 to 3 feet (0.6 to 0.9 m).

Representative pedon: about 8 inches (20 cm) of stratified loamy alluvium over extremely gravelly alluvium to 60 inches (152 cm) or more

FP2—Dackey, cool-Swedna-Swedna, very poorly drained, complex, 0 to 8 percent slopes

(Figure 4)

Setting

Location: along the Main Stem from the Middle Fork confluence to Canyon Rapids—Landtype Association Map Unit 135A1.V2
Elevation: 1,950 to 2,600 feet (594 to 792 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This riparian unit occurs along meandering river reaches; channel gradient is 7 to 25 feet/mile (1.3 to 4.7 m/km).

Composition

Major components:
Dackey, cool, and similar soils: 30 to 50 percent
Swedna and similar soils: 30 to 50 percent
Swedna, very poorly drained, and similar soils: 5 to 15 percent
Minor components:
Hufman soils in depressions and oxbows: 0 to 5 percent
Klute and Kluna soils on terraces: 0 to 5 percent
Gravelly alluvial areas: 0 to 5 percent

Major Component Description

Dackey, cool
Landforms: flood plains
Position on landforms: point bar interiors
Slope: 0 to 4 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: somewhat poorly drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: 1.5 to 3.5 feet (0.5 to 1.1 m)
Available water capacity: mainly 4 inches (10.2 cm)
Ecological site: Loamy flood plains, moderately wet (Low willow/herb scrub)

Note:
Terrace height above the river channel ranges from 3 to 6 feet (0.9 to 1.8 m).

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 27 inches (69 cm) of stratified loamy alluvium over sandy and gravelly alluvium to 60 inches (152 cm) or more

Swedna
Landforms: flood plains
Position on landforms: point bar exteriors
Slope: 0 to 8 percent, plane

Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: poorly drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: frequent
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m)
Available water capacity: mainly 4.2 inches (10.7 cm)
Ecological site: Loamy flood plains, moderately wet (Low willow/herb scrub)

Note:
Terrace height above the river channel ranges from 1.5 to 4 feet (0.5 to 1.2 m).

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 31 inches (79 cm) of stratified loamy alluvium over sandy and gravelly alluvium to 60 inches (152 cm) or more

Swedna, very poorly drained
Landforms: flood plains
Position on landforms: point bar exteriors and low flood plain positions
Slope: 0 to 8 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: very poorly drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: frequent
Depth to seasonally high water table: 0 to 0.5 foot (0 to 0.2 m)
Available water capacity: mainly 4.2 inches (10.7 cm)
Ecological site: Loamy riverbanks (Sedge-grass riparian meadow)

Note:
Terrace height above the river channel ranges from 0 to 1.5 feet (0 to 0.2 m).

Representative pedon: about 31 inches (79 cm) of stratified loamy alluvium over sandy and gravelly alluvium to 60 inches (152 cm) or more

FP3—Dackey-Klute, moderately wet, complex, occasionally flooded
(Figure 5)

Setting

Location: along the Main Stem south of Canyon Rapids and along the lower West Fork—Landtype Association Map Unit 135A1.V4
Elevation: 1,800 to 2,400 feet (549 to 732 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days
Map unit type: complex
Note:
This riparian unit occurs along meandering river channels; channel gradient is 5 to 15 feet/mile (0.9 to 2.8 m/km).

Composition

Major components:
Dackey and similar soils: 50 to 70 percent
Klute, moderately wet, and similar soils: 15 to 35 percent

Minor components:
Gravelly alluvial areas: 0 to 5 percent
Swedna soils on point bar exteriors and oxbows: 0 to 5 percent
Hufman soils in depressions on stream terraces: 0 to 5 percent

Major Component Description

Dackey
Landforms: flood plains
Position on landforms: point bar exteriors
Slope: 0 to 2 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: somewhat poorly drained
Dominant parent material: alluvium
Flooding: occasional
Depth to seasonally high water table: 1.5 to 3.5 feet (0.5 to 1.1 m)
Available water capacity: mainly 4 inches (10.2 cm)
Ecological site: Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)

Note:
Terrace height above the mean summer channel level ranges from 2 to 5 feet (0.6 to 1.5 m).

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

Klute, moderately wet
Landforms: flood plains
Position on landforms: point bar interiors and high flood plain positions
Slope: 0 to 2 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: moderately well drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: 4 to 6 feet (1.2 to 1.8 m)
Available water capacity: mainly 4.3 inches (10.9 cm)
Ecological site: Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)

Note:
Terrace height above the mean summer channel level ranges from 4 to 8 feet (1.2 to 2.4 m). Vegetation often grades from Balsam poplar/thinleaf alder open forest on mid level flood plains to Balsam poplar-white spruce/thinleaf alder open forest on high flood plains.

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 25 inches (64 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

FP4—Dackey-Swedna, very poorly drained, complex

Setting

Location: along the lower reaches of the West Fork— Landtype Association Map Unit 135A1.V4
Elevation: 1,975 to 2,050 feet (602 to 625 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This narrow riparian unit, which is typically 20 to 50 feet (6 to 15 m) wide, occurs along meandering river channels; channel gradient is 5 to 15 feet/mile (0.9 to 2.8 m/km).

Composition

Major components:
Dackey and similar soils: 50 to 70 percent
Swedna, very wet, and similar soils: 20 to 40 percent
Minor components:
Gravelly alluvial areas: 0 to 5 percent
Hogan soils on low stream terraces: 0 to 5 percent

Major Component Description

Dackey
Landforms: flood plains
Position on landforms: high flood plain positions
Slope: 0 to 2 percent
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: somewhat poorly drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: 1.5 to 3.5 feet (0.5 to 1.1 m)
Available water capacity: mainly 4 inches (10.2 cm)
Ecological site: Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)

Note:
Terrace height above the mean summer channel level ranges from 2 to 4 feet (0.6 to 1.2 m).

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

Swedna, very poorly drained
Landforms: flood plains
Position on landforms: low flood plain positions
Slope: 0 to 2 percent
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: very poorly drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: frequent

Depth to seasonally high water table: 0 to 0.5 foot (0 to 0.2 m)
Available water capacity: mainly 4.2 inches (10.7 cm)
Ecological site: Loamy riverbanks (Sedge-grass riparian meadow)

Note:
Terrace height above the mean summer channel level ranges from 0 to 2 feet (0 to 0.6 m).

Representative pedon: about 31 inches (79 cm) of stratified loamy alluvium over sandy and gravelly alluvium to 60 inches (152 cm) or more

FP6—Aquatna, frequently flooded-Hogan, cool, complex

(Figure 9)

Setting

Location: along the upper South Branch—Landtype Association Map Unit 135A1.V8
Elevation: 2,350 to 2,450 feet (716 to 747 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This riparian unit occurs along narrow meandering river channels; channel gradient is about 2 feet/mile (0.4 m/km).

Composition

Major components:
Aquatna and similar soils: 45 to 65 percent
Hogan, cool, and similar soils: 25 to 45 percent
Minor components:
Kuslinad soils on stream terraces: 0 to 5 percent
Hufman soils in depressions and oxbows: 0 to 5 percent

Major Component Description

Aquatna
Landforms: flood plains
Position on landforms: low flood plain positions
Slope: 0 to 2 percent
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly drained
Dominant parent material: stratified loamy alluvium
Flooding: frequent
Depth to seasonally high water table: 0 to 1 foot (0 to 0.3 m)
Available water capacity: mainly 5.2 inches (13.2 cm)
Ecological site: Loamy riverbanks (Sedge-grass riparian meadow)

Note:
Terrace height above the mean summer channel level ranges from 0 to 2.5 feet (0 to 0.8 m).

Representative pedon: stratified loamy alluvium to 60 inches (152 cm) or more

Hogan, cool
Landforms: flood plains
Position on landforms: high flood plain positions
Slope: 0 to 4 percent, plane or convex
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to permafrost
Drainage class: well drained
Dominant parent material: stratified loamy alluvium
Flooding: rare
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 3.6 inches (9.1 cm)
Ecological site: Loamy high flood plains (White spruce/willow open forest)

Note:
Terrace height above the mean summer channel level ranges from 5 to 12 feet (1.5 to 3.7 m).

Representative pedon: about 3 inches (8 cm) of fibrous organic material over 25 inches (64 cm) of loamy alluvium—below this, permafrost

FP12—Tangoe, wet, complex

(Plate 3—upper photo)

Setting

Location: along the upper Middle Fork—Landtype Association Map Unit 135A1.V1
Elevation: 2,550 to 2,850 feet (777 to 869 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This riparian unit occurs along straight river channels; channel gradient is about 38 feet/mile (7.2 m/km).

Composition

Major components:
Tangoe, wet, occasionally flooded, and similar soils: 50 to 70 percent
Tangoe, wet, frequently flooded, and similar soils: 20 to 35 percent
Minor components:
Gravelly alluvial areas: 0 to 5 percent
Ogtna soils on terraces: 0 to 5 percent

Major Component Description

Tangoe, wet, occasionally flooded
Landforms: flood plains
Position on landforms: high flood plain positions
Slope: 0 to 2 percent, plane
Depth class: very shallow—less than 10 inches (less than 25 cm) to sand and gravel
Drainage class: poorly drained
Dominant parent material: gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: 1 to 2 feet (0.3 to 0.6 m)
Available water capacity: mainly 1.2 inches (3 cm)

Ecological site: Gravelly flood plains, moderately wet (Low willow/herb scrub)

Note:
Terrace height above the mean summer channel level is 1.5 to 3 feet (0.5 to 0.9 m). Small areas of barren gravelly alluvium occur throughout this component.

Representative pedon: about 1 inch (3 cm) of fibrous organic material over gravelly alluvium to 60 inches (152 cm) or more

Tangoe, wet, frequently flooded
Landforms: flood plains
Position on landforms: low flood plain positions
Slope: 0 to 2 percent, plane
Depth class: very shallow—less than 10 inches (less than 25 cm) to sand and gravel
Drainage class: very poorly drained
Dominant parent material: gravelly alluvium
Flooding: frequent
Depth to seasonally high water table: 0 to 1 foot (0 to 0.3 m)
Available water capacity: mainly 1.2 inches (3 cm)
Ecological site: Loamy flood plains, wet (Low willow/water sedge scrub)

Note:
Terrace height above the mean summer channel level ranges from 0 to 1.5 feet (0 to 0.5 m).

Representative pedon: very gravelly and very cobbly alluvium to 60 inches (152 cm) or more

FP13—Swedna, high elevation-Hisna complex, 0 to 6 percent slopes

Setting

Location: along the upper Middle Fork—Landtype Association Map Unit 135A1.V1
Elevation: 2,550 to 2,800 feet (777 to 853 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This riparian unit occurs along straight river channels; channel gradient is about 38 feet/mile (7.2 m/km).

Composition

Major components:
Swedna, high elevation, and similar soils: 50 to 75 percent
Hisna and similar soils: 20 to 40 percent
Minor components:
Tangoe, wet, soils in channels and depressions: 0 to 5 percent
Steep soils on escarpments: 0 to 5 percent

Major Component Description

Swedna, high elevation
Landforms: flood plains

Position on landforms: low flood plain positions
Slope: 0 to 6 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: poorly drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m)
Available water capacity: mainly 4.2 inches (10.7 cm)
Ecological site: Loamy flood plains, wet (Low willow/water sedge scrub)

Note:
Terrace height above the mean summer channel level ranges from 0.5 to 3 feet (0.2 to 0.9 m).

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 31 inches (79 cm) of stratified loamy alluvium—below this, gravelly alluvium to 60 inches (152 cm) or more

Hisna
Landforms: flood plains
Position on landforms: high flood plain positions
Slope: 0 to 6 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: very poorly to poorly drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Available water capacity: mainly 5.7 inches (14.5 cm)
Ecological site: Loamy flood plains, wet (Low willow/water sedge scrub)

Note:
Terrace height above the mean summer channel level ranges from 1 to 5 feet (0.3 to 1.5 m).

Representative pedon: about 12 inches (30 cm) of fibrous and partially decomposed organic material over 21 inches (53 cm) of stratified loamy alluvium—below this, gravelly and cobbly alluvium to 60 inches (152 cm) or more

FP21—Swedna, high elevation, complex

(Figure 2; Plate 2—upper photo)

Setting

Location: along the upper Middle Fork—Landtype Association Map Unit 135A1.V1
Elevation: 2,450 to 2,900 feet (747 to 884 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This riparian unit occurs along meandering river channels; channel gradient is about 30 feet/mile (5.7 m/km).

Composition

Major components:
Swedna, high elevation, and similar soils: 40 to 60 percent
Swedna, very poorly drained, and similar soils: 20 to 40 percent
Minor components:
Beaver ponds: 0 to 5 percent
Hufman soils in depressions and oxbows: 0 to 5 percent
Gravelly alluvial areas: 0 to 5 percent
Pippod and Clarena soils on fans: 0 to 5 percent

Major Component Description

Swedna, high elevation
Landforms: flood plains
Position on landforms: low flood plain positions
Slope: 0 to 2 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: poorly drained
Dominant parent material: alluvium
Flooding: occasional
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m)
Available water capacity: mainly 4.2 inches (10.7 cm)
Ecological site: Loamy flood plains, wet (Low willow/water sedge scrub)

Note:
Terrace height above the mean summer channel level ranges from 1.5 to 5 feet (0.5 to 1.5 m).

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 31 inches (79 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

Swedna, very poorly drained
Landforms: flood plains
Position on landforms: low flood plain positions
Slope: 0 to 2 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: very poorly drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: frequent
Depth to seasonally high water table: 0 to 0.5 foot (0 to 0.2 m)
Available water capacity: mainly 4.2 inches (10.7 cm)
Ecological site: Loamy riverbanks (Sedge-grass riparian meadow)

Note:
Terrace height above the mean summer channel level ranges from 0 to 2 feet (0 to 0.6 m).

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 31 inches (79 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

FP22—Dackey, cool-Swedna, high elevation-Kluna complex

Setting

Location: along the middle reaches of the Middle Fork—Landtype Association Map Unit 135A1.V2
Elevation: 2,350 to 2,900 feet (716 to 884 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This riparian unit occurs along meandering river channels; channel gradient is about 25 feet/mile (4.7 m/km).

Composition

Major components:
Dackey, cool, and similar soils: 25 to 45 percent
Swedna, high elevation, and similar soils: 20 to 40 percent
Kluna and similar soils: 20 to 40 percent
Minor components:
Gravelly alluvial areas: 0 to 5 percent
Hufman soils in depressions and oxbows: 0 to 5 percent

Major Component Description

Dackey, cool
Landforms: flood plains
Position on landforms: point bar interiors
Slope: 0 to 2 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: somewhat poorly drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: 1.5 to 3.5 feet (0.5 to 1.1 m)
Available water capacity: mainly 4 inches (10.2 cm)
Ecological site: Loamy flood plains, moderately wet (Low willow/herb scrub)

Note:
Terrace height above the mean summer channel level ranges from 3 to 4 feet (0.9 to 1.2 m).

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

Swedna, high elevation
Landforms: flood plains
Position on landforms: point bar exteriors
Slope: 0 to 2 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: poorly drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: frequent

Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m)
Available water capacity: mainly 4.2 inches (10.7 cm)
Ecological site: Loamy flood plains, wet (Low willow/water sedge scrub)

Note:
Terrace height above the mean summer channel level ranges from 1.5 to 4 feet (0.5 to 1.2 m).

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 31 inches (79 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

Kluna
Landforms: flood plains
Position on landforms: high flood plain positions
Slope: 0 to 2 percent, plane
Depth class: deep—40 to 60 inches (102 to 152 cm) to sand and gravel
Drainage class: moderately well drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: 4 to 6 feet (1.2 to 1.8 m)
Available water capacity: mainly 5.8 inches (14.7 cm)
Ecological site: Loamy high flood plains (White spruce/willow open forest)

Note:
Terrace height above the mean summer channel level ranges from 4 to 8 feet (1.2 to 2.4 m).

Representative pedon: about 2 inches (5 cm) of fibrous organic material over 33 inches (84 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

FP23—Hogan, cool-Sankluna complex, 0 to 15 percent slopes

(Figure 7; Plate 4—upper photo)

Setting

Location: along the lower Middle Fork—Landtype Association Map Unit 135A1.V5
Elevation: 2,450 to 2,550 feet (747 to 777 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This riparian unit occurs along meandering river channels; channel gradient is about 1 foot/mile (0.2 m/km).

Composition

Major components:
Hogan, cool, and similar soils: 55 to 75 percent
Sankluna and similar soils: 15 to 35 percent
Minor components:
Kuslinad soils on stream terraces: 0 to 5 percent

Ganhona soils on stream terraces: 0 to 5 percent
Hufman soils in depressions and oxbows: 0 to 5 percent

Major Component Description

Hogan, cool
Landforms: flood plains
Position on landforms: high flood plain positions
Slope: 0 to 6 percent, plane or convex
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to permafrost
Drainage class: well drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: rare
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 3.6 inches (9.1 cm)
Ecological site: Loamy high flood plains (White spruce/willow open forest)

Note:
Terrace height above the mean summer channel level ranges from 8 to 15 feet (2.4 to 4.6 m).

Representative pedon: about 3 inches (8 cm) of fibrous organic material over 25 inches (64 cm) of stratified loamy alluvium—below this, permafrost

Sankluna
Landforms: flood plains
Position on landforms: point bar exteriors
Slope: 0 to 15 percent, convex
Slope length: 2 to 12 feet (0.6 to 3.7 m)
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: moderately well drained
Dominant parent material: stratified sandy alluvium
Flooding: occasional
Depth to seasonally high water table: 4 to 6 feet (1.2 to 1.8 m)
Available water capacity: mainly 4.8 inches (12.2 cm)
Ecological site: Loamy flood plains, moderately wet (Low willow/herb scrub)

Note:
Terrace height above the mean summer channel level ranges from 3 to 12 feet (0.9 to 3.7 m).

Representative pedon: about 11 inches (28 cm) of stratified loamy alluvium over stratified sandy alluvium to 43 inches (109 cm)—below this, stratified loamy alluvium to 60 inches (152 cm) or more

FP31—Kluna, deep-Hogan-Kluna, frequently flooded, complex
(Figure 6)

Setting

Location: along the middle reaches of the West Fork—Landtype Association Map Unit 135A1.V4
Elevation: 1,975 to 2,050 feet (602 to 625 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days

Map unit type: complex

Note:
This riparian unit occurs along tortuous river channels; channel gradient is generally less than about 16 feet/mile (less than about 3.0 m/km).

Composition

Major components:
Kluna, deep, and similar soils: 30 to 50 percent
Hogan and similar soils: 20 to 40 percent
Kluna, frequently flooded, and similar soils: 15 to 30 percent
Minor components:
Kuslinad soils on stream terraces: 0 to 5 percent
Gravelly alluvial areas: 0 to 5 percent

Major Component Description

Kluna, deep
Landforms: flood plains
Position on landforms: point bar interiors and high flood plain positions
Slope: 0 to 2 percent, plane
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Dominant parent material: stratified loamy alluvium
Flooding: occasional
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 5.8 inches (14.7 cm)
Ecological site: Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)

Note:
Terrace height above the mean summer channel level ranges from 4 to 8 feet (1.2 to 2.4 m).

Representative pedon: about 1 inch (3 cm) of fibrous organic material over stratified loamy alluvium to 60 inches (152 cm) or more

Hogan
Landforms: flood plains
Position on landforms: high flood plain positions
Slope: 0 to 2 percent, plane or convex
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to permafrost
Drainage class: well drained
Dominant parent material: stratified loamy alluvium
Flooding: rare
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 3.6 inches (9.1 cm)
Ecological site: Loamy high flood plains, frozen (White spruce/thinleaf alder open forest)

Note:
Terrace height above the mean summer channel level ranges from 5 to 10 feet (1.5 to 3.0 m).

Representative pedon: about 3 inches (8 cm) of fibrous organic material over 25 inches (63.5 cm) of stratified loamy alluvium—below this, permafrost

Kluna, frequently flooded
Landforms: flood plains
Position on landforms: point bar exteriors and low flood plain positions
Slope: 0 to 2 percent, plane
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: moderately well drained
Dominant parent material: stratified loamy alluvium
Flooding: frequent
Depth to seasonally high water table: 4 to 6 feet (1.2 to 1.8 m)
Available water capacity: mainly 5.8 inches (14.7 cm)
Ecological site: Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)

Note:
Terrace height above the mean summer channel level ranges from 3 to 5 feet (0.9 to 1.5 m).

Representative pedon: stratified loamy alluvium to 60 inches (152 cm) or more

FP32—Dackey-Hogan-Klute, moderately wet, complex

Setting

Location: along the middle reaches of the West Fork—Landtype Association Map Unit 135A1.V4
Elevation: 2,000 to 2,200 feet (610 to 671 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This riparian unit occurs along tortuous river channels; channel gradient is generally less than about 16 feet/mile (less than about 3.0 m/km).

Composition

Major components:
Dackey and similar soils: 30 to 60 percent
Hogan and similar soils: 20 to 40 percent
Klute, moderately wet, and similar soils: 15 to 35 percent
Minor components:
Kuslinad soils on stream terraces: 0 to 5 percent
Gravelly alluvial areas: 0 to 5 percent
Hufman soils in depressions and oxbows: 0 to 5 percent

Major Component Description

Dackey
Landforms: flood plains
Position on landforms: low flood plain positions
Slope: 0 to 2 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: somewhat poorly drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: occasional

Depth to seasonally high water table: 1.5 to 3.5 feet (0.5 to 1.1 m)
Available water capacity: mainly 4 inches (10.2 cm)
Ecological site: Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)

Note:
Terrace height above the mean summer channel level ranges from 3 to 5 feet (0.9 to 1.5 m).

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

Hogan
Landforms: flood plains
Position on landforms: high flood plain positions
Slope: 0 to 2 percent, plane or convex
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to permafrost
Drainage class: well drained
Dominant parent material: stratified loamy alluvium
Flooding: rare
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 3.6 inches (9.1 cm)
Ecological site: Loamy high flood plains, frozen (White spruce/thinleaf alder open forest)

Note:
Terrace height above the mean summer channel level ranges from 5 to 12 feet (1.5 to 3.7 m).

Representative pedon: about 3 inches (8 cm) of fibrous organic material over 25 inches (64 cm) of stratified loamy alluvium—below this, permafrost

Klute, moderately wet
Landforms: flood plains
Position on landforms: point bar exteriors and low flood plain positions
Slope: 0 to 2 percent
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: moderately well drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: 4 to 6 feet (1.2 to 1.8 m)
Available water capacity: mainly 4.3 inches (10.9 cm)
Ecological site: Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)

Note:
Terrace height above the mean summer channel level ranges from 2 to 3 feet (0.6 to 0.9 m).

Representative pedon: about 27 inches (69 cm) of stratified loamy alluvium over sandy and gravelly alluvium to 60 inches (152 cm) or more

GO1—Pippod and Chistna soils, high elevation, 0 to 30 percent slopes

(Figure 14; Plate 12—upper photo)

Setting

Location: uplands in the northwestern part of the area—Landtype Association Map Unit 135A1.G1
Elevation: 2,750 to 3,000 feet (838 to 914 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: undifferentiated group

Note:
Permafrost is generally absent from this subalpine unit.

Composition

Major components:
Pippod, high elevation, and similar soils: 40 to 65 percent
Chistna, high elevation, and similar soils: 30 to 50 percent
Minor components:
Sandy blowouts: 0 to 10 percent
Barren gravelly material: 0 to 10 percent
Soils on steeper slopes: 0 to 5 percent
Chelina soils on glaciolacustrine terraces: 0 to 5 percent

Major Component Description

Pippod, high elevation
Landforms: hills and pitted outwash plains
Position on landforms: all positions
Slope: 0 to 30 percent, all shapes
Slope length: 20 to 200 feet (6 to 61 m)
Depth class: very shallow—less than 10 inches (less than 25 cm) to sand and gravel
Drainage class: somewhat excessively drained
Dominant parent material: loess over gravelly glaciofluvial deposits
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 7 inches (17.8 cm)
Ecological site: Gravelly and sandy hills (Low shrub birch/lichen scrub)

Representative pedon: about 2 inches (5 cm) of fibrous organic material over 2 inches (5 cm) of silty loess—below this, sandy and gravelly glacial outwash to 60 inches (152 cm) or more

Chistna, high elevation
Landforms: hills and pitted outwash plains
Position on landforms: all positions
Slope: 0 to 30 percent, all shapes
Slope length: 20 to 200 feet (6 to 61 m)
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: somewhat excessively drained
Dominant parent material: loess over sandy glaciofluvial deposits
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 3.2 inches (8.1 cm)

Ecological site: Gravelly and sandy hills (Low shrub birch/lichen scrub)

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 1 inch (3 cm) of silty loess—below this, 3 inches (8 cm) of loamy glacial outwash over sandy glacial outwash to 60 inches (152 cm) or more

LC1—Klasi peat, 0 to 10 percent slopes

Setting

Location: uplands in the southeastern and south-central part of the area—Landtype Association Map Unit 135A2.U2
Elevation: 1,850 to 2,500 feet (564 to 762 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days
Map unit type: consociation

Note:
This unit is underlain by continuous permafrost.

Composition

Major components:
Klasi and similar soils: 85 to 95 percent
Minor components:
Gadona soils: 0 to 5 percent
Organic soils in depressions: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent

Major Component Description

Landforms: glaciolacustrine terraces
Position on landforms: all positions
Slope: 0 to 10 percent, plane or undulating
Slope length: 100 to 500 feet (30 to 152 m)
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to permafrost
Drainage class: poorly drained
Dominant parent material: clayey glaciolacustrine deposits
Flooding: none
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m), perched
Available water capacity: mainly 5.3 inches (13.5 cm)
Ecological site: Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)

Representative pedon: about 8 inches (20 cm) of fibrous and partially decomposed organic material over 23 inches (58 cm) of clayey glaciolacustrine material—below this, permafrost

LC2—Gadona silty clay, 0 to 10 percent slopes

Setting

Location: uplands in the southeastern and south-central part of the area—Landtype Association Map Unit 135A2.U2
Elevation: 1,850 to 2,650 feet (564 to 808 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days
Map unit type: consociation

Note:
Permafrost is generally absent from this unit. Permafrost is common in adjoining units.

Composition

Major components:
Gadona and similar soils: 85 to 95 percent
Minor components:
Klasi soils: 0 to 5 percent
Organic soils in depressions: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent

Major Component Description

Landforms: glaciolacustrine terraces
Position on landforms: all positions
Slope: 0 to 10 percent, plane or undulating
Slope length: 100 to 500 feet (30 to 152 m)
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Dominant parent material: clayey glaciolacustrine deposits
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 4.2 inches (10.7 cm)
Ecological site: Glaciolacustrine uplands (Spruce/shrub birch woodland)

Representative pedon: about 1 inch (3 cm) of fibrous organic material over clayey glaciolacustrine material to 60 inches (152 cm) or more

LC5—Klasi-Klasi, very wet, complex, 0 to 12 percent slopes
(Figure 11)

Setting

Location: uplands in the western part of the area—Landtype Association Map Unit 135A2.U3
Elevation: 2,375 to 2,500 feet (724 to 762 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This unit is underlain by continuous permafrost.

Composition

Major components:
Klasi and similar soils: 30 to 60 percent
Klasi, very wet, and similar soils: 30 to 60 percent
Minor components:
Organic soils in depressions: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent

Major Component Description

Klasi
Landforms: glaciolacustrine terraces
Position on landforms: all positions
Slope: 0 to 12 percent, plane or convex
Slope length: 100 to 500 feet (30 to 152 m)
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: poorly drained
Dominant parent material: clayey glaciolacustrine deposits
Flooding: none
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m), perched
Available water capacity: mainly 5.3 inches (13.5 cm)
Ecological site: Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)

Representative pedon: about 8 inches (20 cm) of fibrous and partially decomposed organic material over 23 inches (58 cm) of clayey glaciolacustrine material—below this, permafrost

Klasi, very wet
Landforms: glaciolacustrine terraces
Position on landforms: all positions
Micro-relief: tussocks
Slope: 0 to 5 percent, plane or concave
Slope length: 100 to 500 feet (30 to 152 m)
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: very poorly drained
Dominant parent material: clayey glaciolacustrine deposits
Flooding: none
Depth to seasonally high water table: 0 to 0.5 foot (0 to 0.2 m), perched
Ponding: 0 to 1 foot (0 to 0.3 m), long
Available water capacity: mainly 5.3 inches (13.5 cm)
Ecological site: Terraces, wet (Black spruce/closed sheath cottongrass woodland)

Note:
Ponding occurs in depressions between tussocks.

Representative pedon: about 9 inches (23 cm) of fibrous and partially decomposed organic material over 23 inches (58 cm) of clayey glaciolacustrine material—below this, permafrost

LC6—Swillna, thin surface-Swillna complex, 0 to 15 percent slopes

(Figure 12; Plate 7—upper photo)

Setting

Location: uplands in the western part of the area—Landtype Association Map Unit 135A2.U3
Elevation: 2,375 to 2,500 feet (724 to 762 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days
Map unit type: complex
Note:

This unit is underlain by continuous permafrost. Micro-relief includes frost-heaved mounds up to 2.5 feet (0.8 m) high; spacing between mound summits is about 12 feet (3.7 m) apart.

Composition

Major components:
Swillna, thin surface, and similar soils: 40 to 60 percent
Swillna and similar soils: 25 to 40 percent
Minor components:
Organic soils in depressions: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent

Major Component Description

Swillna thin surface
Landforms: glaciolacustrine terraces
Position on landforms: all positions
Micro-relief: summits of frost boils
Slope: 0 to 15 percent, convex
Slope length: 100 to 500 feet (30 to 152 m)
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: somewhat poorly drained
Dominant parent material: clayey glaciolacustrine deposits
Flooding: none
Depth to seasonally high water table: 2 to 3 feet (0.6 to 0.9 m), perched
Available water capacity: mainly 7.6 inches (19.3 cm)
Ecological site: Glaciolacustrine uplands, ruptic (Spruce/shrub birch woodland)

Note:

This component consists of frost-heaved mounds, the summits of which are often nearly barren of vegetation.

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 40 inches (102 cm) of clayey glaciolacustrine material—below this, permafrost

Swillna
Landforms: glaciolacustrine terraces
Position on landforms: all positions
Micro-relief: depressions between frost boils
Slope: 0 to 15 percent, concave
Slope length: 100 to 500 feet (30 to 152 m)

Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: very poorly to poorly drained
Dominant parent material: clayey glaciolacustrine deposits
Flooding: none
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m), perched
Available water capacity: mainly 5.8 inches (14.7 cm)
Ecological site: Glaciolacustrine uplands, ruptic (Spruce/shrub birch woodland)

Note:
This component consists of intermound depressions.

Representative pedon: about 9 inches (23 cm) of fibrous organic material over 12 inches (31 cm) of clayey glaciolacustrine materials—below this, permafrost.

LL1—Mendna and Chelina soils, 0 to 10 percent slopes

(Figures 10 and 15)

Setting

Location: uplands in the northeastern and south-central portions of the area—Landtype Association Map Units 135A4.M1 and 135A2.U1
Elevation: 2,000 to 2,950 feet (610 to 899 m)
Mean annual precipitation: 15 to 21 inches (38 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: undifferentiated group

Note:
This unit is underlain by discontinuous permafrost.

Composition

Major components:
Mendna and similar soils: 0 to 70 percent
Chelina and similar soils: 0 to 70 percent
Minor components:
Ewan soils in drainages: 0 to 5 percent
Organic soils in depressions: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent

Major Component Description

Mendna
Landforms: glaciolacustrine terraces
Position on landforms: all positions
Slope: 0 to 10 percent, all shapes
Slope length: 100 to 500 feet (30 to 152 m)
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: poorly drained
Dominant parent material: loamy glaciolacustrine deposits
Flooding: none
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m), perched
Available water capacity: mainly 7.7 inches (19.6 cm)

Ecological site: Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)

Representative pedon: about 9 inches (23 cm) of fibrous and partially decomposed organic material over 39 inches (99 cm) of loamy glaciolacustrine material—below this, permafrost

Chelina
Landforms: glaciolacustrine terraces
Position on landforms: all positions
Slope: 0 to 10 percent, all shapes
Slope length: 100 to 500 feet (30 to 152 m)
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Dominant parent material: loamy glaciolacustrine deposits
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 6 inches (15.2 cm)
Ecological site: Glaciolacustrine uplands (Spruce/shrub birch woodland)

Representative pedon: about 1 inch (3 cm) of fibrous organic material over loamy glaciolacustrine material to 60 inches (152 cm) or more

LL2—Mendna-Ewan complex, 0 to 6 percent slopes

(Plate 8—upper photo)

Setting

Location: uplands in the northeastern and south-central portions of the area—Landtype Association Map Unit 135A2.U1
Elevation: 2,150 to 2,900 feet (655 to 884 m)
Mean annual precipitation: 15 to 21 inches (38 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This unit is underlain by discontinuous permafrost.

Composition

Major components:
Mendna and similar soils: 60 to 85 percent
Ewan and similar soils: 10 to 20 percent
Minor components:
Organic soils in depressions: 0 to 5 percent
Chelina soils: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent

Major Component Description

Mendna
Landforms: glaciolacustrine terraces
Position on landforms: all positions
Slope: 0 to 6 percent, plane or undulating
Slope length: 100 to 500 feet (30 to 152 m)

Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: poorly drained
Dominant parent material: loamy glaciolacustrine deposits
Flooding: none
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m), perched
Available water capacity: mainly 7.7 inches (19.6 cm)
Ecological site: Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)

Representative pedon: about 9 inches (23 cm) of fibrous and partially decomposed organic material over 39 inches (99 cm) of loamy glaciolacustrine material—below this, permafrost

Ewan
Landforms: glaciolacustrine terraces
Position on landforms: drainages
Slope: 0 to 6 percent, plane or concave
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly to poorly drained
Dominant parent material: loamy glaciolacustrine deposits
Flooding: occasional
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Available water capacity: mainly 6.1 inches (15.5 cm)
Ecological site: Shallow drainages (Low shrub birch-willow/water sedge scrub)

Note:
This component occurs as narrow stringers along depressions and drainages.

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 4 inches (10 cm) of silty glaciolacustrine material—below this, loamy glaciolacustrine material to 60 inches (152 cm) or more

LL3—Gadona silty clay, 5 to 20 percent slopes

Setting

Location: uplands in the southern portion of the area—Landtype Association Map Unit 135A2.U3
Elevation: 2,400 to 2,650 feet (732 to 808 m)
Mean annual precipitation: 15 to 21 inches (38 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: consociation

Note:
Permafrost is generally absent from this unit, but is common in adjacent units.

Composition

Major components:
Gadona and similar soils: 85 to 95 percent
Minor components:
Klasi soils: 0 to 5 percent
Organic soils in depressions: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent

Major Component Description

Landforms: glaciolacustrine terraces
Position on landforms: all positions
Slope: 5 to 20 percent
Slope length: 100 to 400 feet (30 to 122 m)
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Dominant parent material: clayey glaciolacustrine deposits
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 4.2 inches (10.7 cm)
Ecological site: Glaciolacustrine uplands (Spruce/shrub birch woodland)
Representative pedon: about 1 inch (3 cm) of fibrous organic material over clayey glaciolacustrine material to 60 inches (152 cm) or more

LL12—Chelina loam, 0 to 10 percent slopes

Setting

Location: uplands in the northeastern and south-central portions of the area—Landtype Association Map Units 135A4.M1 and 135A2.U1
Elevation: 1,900 to 2,850 feet (579 to 869 m)
Mean annual precipitation: 15 to 21 inches (38 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: consociation

Note:
Permafrost is generally absent from this unit, but is common in adjoining units.

Composition

Major components:
Chelina and similar soils: 85 to 95 percent
Minor components:
Mendna soils: 0 to 5 percent
Organic soils in depressions: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent

Major Component Description

Landforms: glaciolacustrine terraces
Position on landforms: all positions
Slope: 0 to 10 percent, all shapes
Slope length: 100 to 500 feet (30 to 152 m)
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Dominant parent material: loamy glaciolacustrine deposits
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 6 inches (15.2 cm)
Ecological site: Glaciolacustrine uplands (Spruce/shrub birch woodland)

Representative pedon: about 1 inch (3 cm) of fibrous organic material over loamy glaciolacustrine material to 60 inches (152 cm) or more

LL13—Chelina loam, 7 to 25 percent slopes

Setting

Location: uplands in the northeastern and south-central portions of the area—Landtype Association Map Units 135A4.M1 and 135A2.U1
Elevation: 2,700 to 2,800 feet (823 to 853 m)
Mean annual precipitation: 15 to 21 inches (38 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: consociation

Note:
Permafrost is generally absent from this unit but is common in adjoining units.

Composition

Major components:
Chelina and similar soils: 85 to 95 percent
Minor components:
Mendna soils: 0 to 5 percent
Organic soils in depressions: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent

Major Component Description

Landforms: hills
Position on landforms: all positions
Slope: 7 to 25 percent, all shapes
Slope length: 100 to 400 feet (30 to 122 m)
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Dominant parent material: loamy glaciolacustrine deposits
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 6 inches (15.2 cm)
Ecological site: Glaciolacustrine uplands (Spruce/shrub birch woodland)

Representative pedon: about 1 inch (3 cm) of fibrous material over loamy glaciolacustrine material to 60 inches (152 cm) or more

LL41—Pergelic Cryohemists, dry-Cryofibrists complex, 0 to 14 percent slopes

(Figure 13; Plates 9—lower photo and 10—lower photo)

Setting

Location: uplands in the northeastern and south-central portions of the area—Landtype Association Map Units 135A2.U1, 135A2.U2, 135A2.U3, and 135A2.U4
Elevation: 2,150 to 2,850 feet (655 to 869 m)
Mean annual precipitation: 15 to 21 inches (38 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This unit is underlain by discontinuous permafrost.

Composition

Major components:
Pergelic Cryohemists, dry, and similar soils: 40 to 65 percent
Cryofibrists and similar soils: 20 to 40 percent
Minor components:
Mendna soils on glaciolacustrine terraces: 0 to 5 percent
Chelina soils on glaciolacustrine terraces: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent

Major Component Description

Pergelic Cryohemists, dry
Landforms: glaciolacustrine terraces
Position on landforms: palsen and peat mounds
Slope: 0 to 14 percent, plane or convex
Slope length: 10 to 40 feet (3 to 12 m)
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to permafrost
Drainage class: well drained
Dominant parent material: organic material over variable frozen materials
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 8.8 inches (22.4 cm)
Ecological site: Peat mounds (Spruce/shrub birch woodland)

Note:
This component occurs on permafrost-cored mounds and ridges surrounding ponds.

Representative pedon: about 27 inches (69 cm) of fibrous and partially decomposed organic material over permafrost

Cryofibrists
Landforms: glaciolacustrine terraces
Position on landforms: depressions
Slope: 0 to 2 percent, concave
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly drained
Dominant parent material: organic material over variable materials
Flooding: none
Depth to seasonally high water table: 0 to 1 foot (0 to 0.3 m)
Ponding: 0.5 foot to 1.5 feet (0.2 to 0.5 m), long
Available water capacity: mainly 9.4 inches (23.9 cm)
Ecological site: Wet depressions (Sedge wet meadow)

Note:
This component occurs in depressions and along pond margins.

Representative pedon: about 29 inches (74 cm) of fibrous organic material over water, peat, or clayey or loamy mineral soil

LL411—Pergelic Cryohemists-Mendna, very wet-Cryofibrists complex, 0 to 14 percent slopes

(Plate 10—lower photo)

Setting

Location: uplands in the western portion of the area—Landtype Association Map Units 135A2.U1, 135A2.U2, 135A2.U3, and 135A2.U4
Elevation: 2,500 to 2,650 feet (762 to 808 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This unit is underlain by discontinuous permafrost.

Composition

Major components:
Pergelic Cryohemists and similar soils: 30 to 50 percent
Mendna, very wet, and similar soils: 20 to 40 percent
Cryofibrists and similar soils: 5 to 20 percent
Minor components:
Water: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent
Pergelic Cryohemists soils on mounds: 0 to 5 percent

Major Component Description

Pergelic Cryohemists
Landforms: glaciolacustrine terraces
Position on landforms: all positions
Micro-relief: tussocks and hummocks
Slope: 0 to 14 percent, plane or concave
Slope length: 50 to 200 feet (15 to 61 m)
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to permafrost
Drainage class: very poorly drained
Dominant parent material: organic material over variable frozen materials
Flooding: none
Depth to seasonally high water table: 0 to 1 foot (0 to 0.3 m), perched
Ponding: 0 to 1 foot (0 to 0.3 m), long
Available water capacity: mainly 8.8 inches (22.4 cm)
Ecological site: Terraces, wet (Black spruce/closed sheath cottongrass woodland)

Note:
Ponding occurs in depressions between tussocks and hummocks.

Representative pedon: about 27 inches (69 cm) of fibrous and partially decomposed organic material over permafrost

Mendna, very wet
Landforms: glaciolacustrine terraces
Position on landforms: all positions
Micro-relief: tussocks
Slope: 0 to 14 percent

Slope length: 50 to 200 feet (15 to 61 m)
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: very poorly drained
Dominant parent material: organic material over variable materials
Flooding: none
Depth to seasonally high water table: 0 to 0.5 foot (0 to 0.2 m), perched
Ponding: 0 to 1 foot (0 to 0.2 m), long
Available water capacity: mainly 7.7 inches (19.6 cm)
Ecological site: Terraces, wet (Black spruce/closed sheath cottongrass woodland)

Note:
Ponding occurs in depressions between tussocks.

Representative pedon: about 9 inches (23 cm) of fibrous and partially decomposed organic material over 39 inches (99 cm) of loamy glaciolacustrine material—below this, permafrost

Cryofibrists
Landforms: glaciolacustrine terraces
Position on landforms: depressions
Slope: 0 to 1 percent, plane or concave
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly drained
Dominant parent material: organic material over variable materials
Flooding: none
Depth to seasonally high water table: 0 to 1 foot (0 to 0.3 m)
Ponding: 0.5 foot to 1.5 feet (0.2 to 0.5 m), long
Available water capacity: mainly 9.4 inches (23.9 cm)
Ecological site: Wet depressions (Sedge wet meadow)

Representative pedon: about 29 inches (74 cm) of fibrous organic material over water, peat, or clayey or loamy mineral soil to 60 inches (152 cm) or more

MK1—Hufman peat

(Plate 10—upper photo)

Setting

Location: river valleys throughout the area—Landtype Association Map Units 135A1.V2, 135A1.V3, 135A1.V4, 135A1.V5, 135A1.V6, and 135A1.V7
Elevation: 1,850 to 2,600 feet (564 to 792 m)
Mean annual precipitation: 15 to 21 inches (38 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: consociation

Note:
This unit often occurs on pond margins. Permafrost is generally absent.

Composition

Major components:
Hufman and similar soils: 85 to 95 percent
Minor components:
Kuslinad soils on stream terraces: 0 to 5 percent

Oxbow lakes and ponds: 0 to 5 percent
Ice cored mounds: 0 to 5 percent

Major Component Description

Landforms: stream terraces
Position on landforms: depressions
Slope: 0 to 1 percent, concave
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly drained
Dominant parent material: organic material over loamy alluvium
Flooding: rare
Depth to seasonally high water table: 0 to 0.5 foot (0 to 0.2 m)
Ponding: 0.5 foot to 1.5 feet (0.2 to 0.5 m), long
Available water capacity: mainly 10.7 inches (26.7 cm)
Ecological site: Wet depressions (Sedge wet meadow)

Note:
This component often occurs along pond margins.

Representative pedon: about 26 inches (66 cm) of fibrous organic material over 8 inches (20 cm) of silty alluvium—below this, stratified loamy alluvium to 60 inches (152 cm) or more

MK2—Pergelic Cryohemists and Cryofibrists soils
(Figures 10 and 11)

Setting

Location: uplands throughout the area—Landtype Association Map Units 135A2.U1, 135A2.U2, 135A2.U3, and 135A2.U4
Elevation: 1,900 to 2,600 feet (579 to 792 m)
Mean annual precipitation: 15 to 21 inches (38 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: undifferentiated group

Note:
This unit is underlain by discontinuous permafrost.

Composition

Major components:
Pergelic Cryohemists and similar soils: 0 to 80 percent
Cryofibrists and similar soils: 0 to 80 percent
Minor components:
Well drained mineral soils on microhighs: 0 to 5 percent
Ponds: 0 to 10 percent

Major Component Description

Pergelic Cryohemists
Landforms: glaciolacustrine terraces
Position on landforms: all positions
Micro-relief: tussocks and hummocks
Slope: 0 to 2 percent, plane or concave

Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to permafrost
Drainage class: very poorly drained
Dominant parent material: organic material over variable materials
Flooding: none
Depth to seasonally high water table: 0 to 1 foot (0 to 0.3 m), perched
Ponding: 0 to 1 foot (0 to 0.3 m), long
Available water capacity: mainly 8.8 inches (22.4 cm)
Ecological site: Terraces, wet (Black spruce/closed sheath cottongrass woodland)

Note:
Ponding occurs in depressions between tussocks and hummocks.

Representative pedon: about 27 inches (69 cm) of fibrous and partially decomposed organic material over permafrost

Cryofibrists
Landforms: glaciolacustrine terraces
Position on landforms: depressions
Slope: 0 to 2 percent, concave
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly drained
Dominant parent material: organic material over variable materials
Flooding: none
Depth to seasonally high water table: 0 to 1 foot (0 to 0.3 m)
Ponding: 0.5 foot to 1.5 feet (0.2 to 0.5 m), long
Available water capacity: mainly 9.4 inches (23.9 cm)
Ecological site: Wet depressions (Sedge wet meadow)

Note:
This component occurs in depressions and along pond margins.

Representative pedon: about 29 inches (74 cm) of fibrous organic material over water, peat, or clayey or loamy mineral soil to 60 inches (152 cm) or more

SA1—Nickolna silt loam, 4 to 16 percent slopes
(Figure 15)

Setting

Location: uplands in the northeastern part of the area—Landtype Association Map Unit 135A4.M1
Elevation: 2,600 to 2,900 feet (792 to 884 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: consociation

Note:
Permafrost is generally absent from this subalpine unit. Differences in micro-climate and fire history contribute to patchiness in the vegetation.

Composition

Major components:
Nickolna and similar soils: 85 to 95 percent

Minor components:
Mendna soils: 0 to 5 percent
Cobblank soils: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent

Major Component Description

Landforms: hills and mountains
Position on landforms: backslopes, shoulders, and summits
Slope: 4 to 16 percent, plane or convex
Slope length: 300 to 1,200 feet (91 to 366 m)
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Dominant parent material: loess over loamy glaciolacustrine deposits
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 6.3 inches (16 cm)
Ecological site: Loamy backslopes

Representative pedon: about 2 inches (5 cm) of fibrous organic material over 8 inches (20 cm) of silty loess—below this, loamy glaciolacustrine material to 60 inches (152 cm) or more

SA3—Goodview-Rock outcrop complex, 20 to 50 percent slopes

Setting

Location: uplands in the northern portion of the area—Landtype Association Map Unit 135A4.M1
Elevation: 3,000 to 3,300 feet (914 to 1,006 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
Permafrost is generally absent from this subalpine unit.

Composition

Major components:
Goodview and similar soils: 50 to 75 percent
Rock outcrop: 15 to 40 percent
Minor components:
Poorly drained soils on footslopes: 0 to 5 percent
Chelina soils on toeslopes: 0 to 5 percent

Major Component Description

Goodview
Landforms: mountains
Position on landforms: backslopes and footslopes
Slope: 20 to 50 percent, plane, northeast aspect
Slope length: 500 to 2,500 feet (152 to 762 m)
Depth class: very shallow and shallow—less than 20 inches (less than 51 cm) to unweathered bedrock

Drainage class: well drained
Dominant parent material: loess over residuum
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 1.5 inches (3.8 cm)
Ecological site: Upper mountain slopes, shallow (Low shrub birch scrub)

Representative pedon: about 5 inches (13 cm) of fibrous organic material over 6 inches (15 cm) of silty loess—below this, consolidated bedrock

Rock outcrop
Definition: exposures of unvegetated bedrock
Landforms: mountains
Position on landforms: backslopes and footslopes

ST1—Klute and Kluna soils, 0 to 3 percent slopes

(Figure 4)

Setting

Location: along the middle reaches of the Middle Fork and middle and upper reaches of the Main Stem—Landtype Association Map Unit 135A1.V2
Elevation: 2,100 to 2,700 feet (640 to 823 m)
Mean annual precipitation: 15 to 21 inches (38 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: undifferentiated group

Note:
This riparian unit occurs along meandering river channels; channel gradient is 16 to 50 feet/mile (3.0 to 9.5 m/km).

Composition

Major components:
Klute and similar soils: 0 to 85 percent
Kluna and similar soils: 0 to 85 percent
Minor components:
Swedna soils on low flood plains: 0 to 5 percent
Kuslinad soils on stream terraces: 0 to 5 percent
Hufman soils in depressions: 0 to 5 percent

Major Component Description

Klute
Landforms: flood plains
Position on landforms: high flood plain positions
Slope: 0 to 3 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: well drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 5.1 inches (13 cm)
Ecological site: Loamy high flood plains (White spruce/willow open forest)

Note:
Terrace height above the mean summer channel level ranges from 4 to 8 feet (1.2 to 2.4 m).

Representative pedon: about 2 inches (5 cm) of fibrous organic material over 33 inches (84 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

Kluna
Landforms: stream terraces
Position on landforms: low stream terrace positions
Slope: 0 to 3 percent, plane
Depth class: deep—40 to 60 inches (102 to 152 cm) to sand and gravel
Drainage class: moderately well drained
Dominant parent material: stratified loamy alluvium
Flooding: occasional
Depth to seasonally high water table: 4 to 6 feet (1.2 to 1.8 m)
Available water capacity: mainly 5.8 inches (14.7 cm)
Ecological site: Loamy high flood plains (White spruce/willow open forest)

Note:
Terrace height above the mean summer channel level ranges from 4 to 12 feet (1.2 to 3.7 m).

Representative pedon: about 2 inches (5 cm) of fibrous organic material over 45 inches (114 cm) of stratified loamy alluvium—below this, sand and gravel to 60 inches (152 cm) or more

ST2—Kuslinad-Pergelic Cryohemists, dry-Hufman complex, 0 to 14 percent slopes

Setting

Location: along the middle and lower reaches of the Main Stem—Landtype Association Map Units 135A1.V2 and 135A1.V4
Elevation: 1,850 to 2,450 feet (564 to 747 m)
Mean annual precipitation: 15 to 21 inches (38 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This unit is underlain by discontinuous permafrost.

Composition

Major components:
Kuslinad and similar soils: 30 to 55 percent
Pergelic Cryohemists, dry, and similar soils: 20 to 40 percent
Hufman and similar soils: 10 to 25 percent
Minor components:
Ponds: 0 to 10 percent
Klute and Kluna soils: 0 to 10 percent

Major Component Description

Kuslinad
Landforms: stream terraces
Position on landforms: all positions
Slope: 0 to 6 percent, plane
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: poorly drained
Dominant parent material: stratified loamy alluvium
Flooding: none
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m), perched
Available water capacity: mainly 5.7 inches (14.5 cm)
Ecological site: Stream terraces, frozen (Spruce/spruce muskeg sedge open forest)

Note:
Terrace height above the mean summer channel level ranges from 8 to 15 feet (2.4 to 4.6 m).

Representative pedon: about 8 inches (20 cm) of fibrous and partially decomposed organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, permafrost

Pergelic Cryohemists, dry
Landforms: stream terraces
Position on landforms: palsen and peat mounds
Slope: 0 to 14 percent, plane or convex
Slope length: 10 to 40 feet (3 to 12 m)
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to permafrost
Drainage class: well drained
Dominant parent material: organic material over variable frozen materials
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 8.8 inches (22.4 cm)
Ecological site: Peat mounds (Spruce/shrub birch woodland)

Note:
This component consists of permafrost cored peat mounds and ridges. Height above the adjacent wet meadows and ponds ranges from 10 to 35 feet (3 to 11 m).

Representative pedon: about 27 inches (69 cm) of fibrous and partially decomposed organic material over permafrost

Hufman
Landforms: flood plains
Position on landforms: backswamps, cutoff meanders, and depressions
Slope: 0 to 2 percent, plane or concave
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly drained
Dominant parent material: organic material over loamy alluvium
Flooding: rare
Depth to seasonally high water table: 0 to 0.5 foot (0 to 0.2 m)
Ponding: 0.5 foot to 1.5 feet (0.2 to 0.5 m), long
Available water capacity: mainly 10.7 inches (27.2 cm)
Ecological site: Wet depressions (Sedge wet meadow)

Note:

Terrace height above the mean summer channel level ranges from 8 to 12 feet (2.4 to 3.7 m).

Representative pedon: about 26 inches (66 cm) of fibrous organic material over 8 inches (20 cm) of silty alluvium—below this, stratified loamy alluvium to 60 inches (152 cm) or more

ST3—Dackey-Hogan complex, 0 to 4 percent slopes

(Plate 11—upper photo)

Setting

Location: along the middle reaches of the Main Stem—Landtype Association Map Units 135A1.V3 and 135A1.V4
Elevation: 1,900 to 2,500 feet (579 to 762 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:

This riparian unit occurs along meandering river channels; channel gradient is 16 to 50 feet/mile (3.0 to 9.5 m/km). Permafrost is continuous.

Composition

Major components:
Dackey and similar soils: 45 to 65 percent
Hogan and similar soils: 25 to 45 percent
Minor components:
Swedna soils on low flood plains: 0 to 5 percent
Kuslinad soils on stream terraces: 0 to 5 percent

Major Component Description

Dackey
Landforms: flood plains
Position on landforms: low flood plain positions
Slope: 0 to 4 percent, plane or convex
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: somewhat poorly drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: 1.5 to 3.5 feet (0.5 to 1.1 m)
Available water capacity: mainly 4 inches (10.2 cm)
Ecological site: Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)

Note:

Terrace height above the mean summer channel level ranges from 1.5 to 5 feet (0.5 to 1.5 m).

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

Hogan
Landforms: flood plains
Position on landforms: high flood plain positions
Slope: 0 to 4 percent, plane or convex
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to permafrost
Drainage class: well drained
Dominant parent material: stratified loamy alluvium
Flooding: rare
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 3.6 inches (9.1 cm)
Ecological site: Loamy high flood plains, frozen (White spruce/thinleaf alder open forest)

Note:
Terrace height above the mean summer channel level ranges from 5 to 12 feet (1.5 to 3.7 m).

Representative pedon: about 3 inches (8 cm) of fibrous organic material over 25 inches (64 cm) of stratified loamy alluvium—below this, permafrost

ST4—Hogan fine sandy loam

Setting

Location: along the lower reaches of the Main Stem—Landtype Association Map Unit 135A1.V4
Elevation: 1,850 to 2,500 feet (564 to 762 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days
Map unit type: consociation

Note:
This riparian unit is underlain by continuous permafrost.

Composition

Major components:
Hogan and similar soils: 85 to 95 percent
Minor components:
Kuslinad soils on stream terraces: 0 to 5 percent
Dackey soils on flood plains: 0 to 5 percent
Hufman soils in depressions and oxbows: 0 to 5 percent

Major Component Description

Landforms: flood plains
Position on landforms: high flood plain positions
Slope: 0 to 2 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to permafrost
Drainage class: well drained
Dominant parent material: stratified loamy alluvium
Flooding: rare
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 3.6 inches (9.1 cm)
Ecological site: Loamy high flood plains, frozen (White spruce/thinleaf alder open forest)

Note:
Terrace height above the mean summer channel level ranges from 5 to 10 feet (1.5 to 3 m).

Representative pedon: about 3 inches (8 cm) of fibrous organic material over 25 inches (64 cm) of stratified loamy alluvium—below this, permafrost

ST5—Haggard peat, 0 to 4 percent slopes

Setting

Location: along the lower reaches of the Main Stem and middle and lower reaches of the West Fork—Landtype Association Map Unit 135A1.V4
Elevation: 1,850 to 2,050 feet (564 to 625 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days
Map unit type: consociation

Note:
This unit is underlain by continuous permafrost.

Composition

Major components:
Haggard and similar soils: 85 to 95 percent
Minor components:
Hufman soils in depressions and oxbows: 0 to 5 percent
Kuslinad soils: 0 to 5 percent
Ponds and oxbows: 0 to 5 percent

Major Component Description

Landforms: stream terraces
Position on landforms: all positions
Micro-relief: tussocks
Slope: 0 to 4 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to permafrost
Drainage class: very poorly drained
Dominant parent material: organic material over loamy alluvium
Flooding: none
Depth to seasonally high water table: 0 to 1 foot (0 to 0.3 m), perched
Ponding: 0 to 1 foot (0 to 0.3 m), long
Available water capacity: mainly 8 inches (20.3 cm)
Ecological site: Terraces, wet (Black spruce/closed sheath cottongrass woodland)

Note:
Terrace height above the mean summer channel level ranges from 5 to 20 feet (1.5 to 6.1 m). Ponding occurs in depressions between tussocks.

Representative pedon: about 24 inches (61 cm) of fibrous and partially decomposed organic material over permafrost

ST11—Klute-Tangoe, occasionally flooded, complex

Setting

Location: along the middle reaches of the Middle Fork—Landtype Association Map Unit 135A1.V2
Elevation: 2,475 to 2,600 feet (754 to 792 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This riparian unit occurs along meandering river channels; channel gradient is 7 to 25 feet/mile (1.3 to 4.7 m/km).

Composition

Major components:
Klute and similar soils: 40 to 60 percent
Tangoe, occasionally flooded, and similar soils: 30 to 50 percent
Minor components:
Tangoe, frequently flooded, soils on low flood plains: 0 to 5 percent
Swedna soils on flood plains: 0 to 5 percent

Major Component Description

Klute
Landforms: stream terraces
Position on landforms: low stream terrace positions
Slope: 0 to 2 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: well drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 5.1 inches (13 cm)
Ecological site: Loamy high flood plains (White spruce/willow open forest)

Note:
Terrace height above the mean summer channel level ranges from 4 to 6 feet (1.2 to 1.8 m).

Representative pedon: about 2 inches (5 cm) of fibrous organic material over 25 inches (64 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

Tangoe, occasionally flooded
Landforms: stream terraces
Position on landforms: low stream terrace positions
Slope: 0 to 2 percent, plane
Depth class: very shallow—less than 10 inches (less than 25 cm) to sand and gravel
Drainage class: somewhat poorly drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: 2 to 3.5 feet (0.6 to 1.1 m)

Available water capacity: mainly 1.8 inches (4.6 cm)
Ecological site: Loamy high flood plains (White spruce/willow open forest)

Note:
Terrace height above the mean summer channel level ranges from 4 to 8 feet (1.2 to 2.4 m).

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 3 inches (8 cm) of silty alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

ST12—Ogtna mucky fine sandy loam

Setting

Location: along the upper Middle Fork—Landtype Association Map Unit 135A1.V1
Elevation: 2,800 to 2,900 feet (853 to 884 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: consociation

Note:
This unit is of very limited distribution and extent.

Composition

Major components:
Ogtna and similar soils: 85 to 95 percent
Minor components:
Dackey soils: 0 to 5 percent
Clarena and Pippod soils on fans: 0 to 10 percent

Major Component Description

Landforms: stream terraces
Position on landforms: all positions
Slope: 0 to 2 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: well drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 5 inches (12.7 cm)
Ecological site: Loamy flood plains, moderately wet (Low willow/herb scrub)

Note:
Terrace height above the mean summer channel level ranges from 6 to 12 feet (1.8 to 3.7 m).

Representative pedon: about 6 inches (15 cm) of fibrous and decomposed organic material over 13 inches (33 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

ST13—Tangoe, occasionally flooded-Klute, occasionally flooded, complex, 2 to 7 percent slopes

(Figure 8)

Setting

Location: along the middle reaches of the Middle Fork—Landtype Association Map Units 135A1.V2 and 135A1.V6
Elevation: 2,500 to 2,700 feet (762 to 823 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This riparian unit includes flood plains on the main river channel and nearby alluvial fans. On flood plains, the channel is typically meandering; channel gradient is 7 to 25 feet/mile (1.3 to 4.7 m/km).

Composition

Major components:
Tangoe, occasionally flooded, and similar soils: 40 to 60 percent
Klute, occasionally flooded, and similar soils: 30 to 50 percent
Minor components:
Gravelly alluvial areas: 0 to 10 percent
Dackey soils: 0 to 5 percent

Major Component Description

Tangoe, occasionally flooded
Landforms: flood plains and alluvial fans
Position on landforms: high flood plain positions
Slope: 2 to 7 percent, plane
Depth class: very shallow—less than 10 inches (less than 25 cm) to sand and gravel
Drainage class: somewhat poorly drained
Dominant parent material: gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: 2 to 3.5 feet (0.6 to 1.1 m)
Available water capacity: mainly 1.8 inches (4.6 cm)
Ecological site: Loamy high flood plains (White spruce/willow open forest)

Note:
Terrace height above the mean summer channel level ranges from 2 to 5 feet (0.6 to 1.5 m).

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 3 inches (8 cm) of silty alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

Klute, occasionally flooded
Landforms: flood plains and alluvial fans
Position on landforms: high flood plain positions
Slope: 2 to 7 percent, plane
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel

Drainage class: well drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 5.1 inches (13 cm)
Ecological site: Loamy high flood plains (White spruce/willow open forest)

Note:
Terrace height above the mean summer channel level ranges from 5 to 8 feet (1.5 to 2.3 m).

Representative pedon: about 2 inches (5 cm) of fibrous organic material over 33 inches (84 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

ST21—Kuslinad peat

(Figure 4; Plate 11—upper photo)

Setting

Location: along the middle and lower reaches of the Main Stem, Middle Fork, and West Fork—Landtype Association Map Units 135A1.V2, 135A1.V3, 135A1.V4, and 135A1.V5
Elevation: 1,850 to 2,500 feet (564 to 762 m)
Mean annual precipitation: 15 to 21 inches (38 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: consociation

Note:
This unit is underlain by continuous permafrost.

Composition

Major components:
Kuslinad and similar soils: 85 to 95 percent
Minor components:
Kuslinad, very wet soils, in cottongrass tussocks: 0 to 10 percent
Hufman soils in depressions and oxbows: 0 to 10 percent
Hogan soils on high flood plains: 0 to 5 percent

Major Component Description

Landforms: stream terraces
Position on landforms: all positions
Slope: 0 to 2 percent, plane
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: poorly drained
Dominant parent material: stratified loamy alluvium
Flooding: none
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m), perched
Available water capacity: mainly 5.7 inches (14.5 cm)
Ecological site: Stream terraces, frozen (Spruce/spruce muskeg sedge open forest)

Note:
Terrace height above the mean summer channel level ranges from 5 to 18 feet (1.5 to 5.5 m).

Representative pedon: about 8 inches (20 cm) of fibrous and partially decomposed organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, permafrost

ST22—Kuslinad-Ganhona complex, 0 to 20 percent slopes

(Figure 7; Plate 4—upper photo)

Setting

Location: along the lower reaches of the Middle Fork—Landtype Association Map Unit 135A1.V5
Elevation: 2,300 to 2,600 feet (701 to 792 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This unit is underlain by discontinuous permafrost.

Composition

Major components:
Kuslinad and similar soils: 40 to 60 percent
Ganhona and similar soils: 30 to 50 percent
Minor components:
Hufman soils in depressions and oxbows: 0 to 10 percent
Ponds and oxbows: 0 to 5 percent
Hogan soils on low stream terraces: 0 to 5 percent

Major Component Description

Kuslinad
Landforms: stream terraces
Position on landforms: all positions
Slope: 0 to 6 percent, plane
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: poorly drained
Dominant parent material: stratified loamy alluvium
Flooding: none
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m), perched
Available water capacity: mainly 5.7 inches (14.5 cm)
Ecological site: Stream terraces, frozen (Spruce/spruce muskeg sedge open forest)

Note:
Terrace height above the mean summer channel level ranges from 10 to 20 feet (3 to 6.1 m).

Representative pedon: about 8 inches (20 cm) of fibrous and partially decomposed organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, permafrost

Ganhona
Landforms: hills and ridges
Position on landforms: all positions
Slope: 2 to 20 percent, convex
Slope length: 10 to 50 feet (3 to 15 m)
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Dominant parent material: loess over stratified loamy alluvium
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 5.9 inches (15 cm)
Ecological site: Stream terraces (Spruce/shrub birch woodland)

Note:
Height of hills and ridges above the nonvegetated river channel ranges from 10 to 20 feet (3.0 to 6.1 m).

Representative pedon: about 7 inches (18 cm) of fibrous organic material over 2 inches (5 cm) of silty loess—below this, 50 inches (127 cm) of stratified loamy alluvium over stratified sandy alluvium to 60 inches (152 cm) or more

ST24—Kuslinad-Kuslinad, very wet, complex

Setting

Location: along the upper South Branch and the lower reaches of the Main Stem and West Fork—Landtype Association Map Units 135A1.V4 and 135A1.V7
Elevation: 1,850 to 2,450 feet (564 to 746 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This unit receives significant additions of water as run-in for the adjacent uplands. Permafrost is continuous.

Composition

Major components:
Kuslinad and similar soils: 35 to 55 percent
Kuslinad, very wet, and similar soils: 35 to 55 percent
Minor components:
Organic soils in depressions and oxbows: 0 to 5 percent
Kusdry soils: 0 to 5 percent
Hogan soils on low stream terraces: 0 to 5 percent

Major Component Description

Kuslinad
Landforms: stream terraces
Position on landforms: all positions
Slope: 0 to 2 percent, plane
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: poorly drained

Dominant parent material: stratified loamy alluvium
Flooding: none
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m), perched
Available water capacity: mainly 5.7 inches (14.5 cm)
Ecological site: Stream terraces, frozen (Spruce/spruce muskeg sedge open forest)

Note:
Terrace height above the mean summer channel level ranges from 8 to 25 feet (2.4 to 7.6 m).

Representative pedon: about 8 inches (20 cm) of fibrous and partially decomposed organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, permafrost

Kuslinad, very wet
Landforms: stream terraces
Position on landforms: all positions
Micro-relief: tussocks
Slope: 0 to 2 percent, plane or concave
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: very poorly drained
Dominant parent material: stratified loamy alluvium
Flooding: none
Depth to seasonally high water table: 0 to 0.5 foot (0 to 0.2 m), perched
Ponding: 0 to 1 foot (0 to 0.3 m), long
Available water capacity: mainly 5.7 inches (14.5 cm)
Ecological site: Terraces, wet (Black spruce/closed sheath cottongrass woodland)

Note:
Terrace height above the mean summer channel level ranges from 6 to 20 feet (1.8 to 6.1 m). Ponding occurs in depressions between tussocks.

Representative pedon: about 9 inches (23 cm) of fibrous and partially decomposed organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, permafrost

ST24B—Kuslinad-Kuslinad, very wet-Kusdry complex

Setting

Location: along the lower reaches of the West Fork—Landtype Association Map Unit 135A1.V4
Elevation: 1,950 to 2,100 feet (594 to 640 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This unit is underlain by discontinuous permafrost.

Composition

Major components:
Kuslinad and similar soils: 25 to 45 percent

Kuslinad, very wet, and similar soils: 20 to 40 percent
Kusdry and similar soils: 20 to 40 percent
Minor components:
Organic soils in depressions and oxbows: 0 to 5 percent
Hogan soils on low stream terraces: 0 to 5 percent

Major Component Description

Kuslinad
Landforms: stream terraces
Position on landforms: all positions
Slope: 0 to 2 percent, plane
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: poorly drained
Dominant parent material: stratified loamy alluvium
Flooding: none
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m), perched
Available water capacity: mainly 5.7 inches (14.5 cm)
Ecological site: Stream terraces, frozen (Spruce/spruce muskeg sedge open forest)

Note:
Terrace height above the mean summer channel level ranges from 6 to 12 feet (1.8 to 3.7 m).

Representative pedon: about 8 inches (20 cm) of fibrous organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, permafrost

Kuslinad, very wet
Landforms: stream terraces
Position on landforms: all positions
Micro-relief: tussocks
Slope: 0 to 2 percent, plane or concave
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: very poorly drained
Dominant parent material: stratified loamy alluvium
Flooding: none
Depth to seasonally high water table: 0 to 0.5 foot (0 to 0.2 m), perched
Ponding: 0 to 1 foot (0 to 0.3 m), long
Available water capacity: mainly 5.7 inches (14.5 cm)
Ecological site: Terraces, wet (Black spruce/closed sheath cottongrass woodland)

Note:
Terrace height above the mean summer channel level ranges from 6 to 12 feet (1.8 to 3.7 m). Ponding occurs in depressions between tussocks.

Representative pedon: about 9 inches (23 cm) of fibrous and partially decomposed organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, permafrost

Kusdry
Landforms: stream terraces
Position on landforms: all positions
Slope: 0 to 2 percent, plane
Depth class: deep—40 to 60 inches (102 to 152 cm) to sand and gravel

Drainage class: somewhat poorly drained
Dominant parent material: stratified loamy alluvium
Flooding: none
Depth to seasonally high water table: 1.5 to 3 feet (0.5 to 0.9 m)
Available water capacity: mainly 5.3 inches (13.5 cm)
Ecological site: Stream terraces (Spruce/shrub birch woodland)

Note:
Terrace height above the mean summer channel level ranges from 6 to 12 feet (1.8 to 3.7 m). Wildfire in this unit has reduced the thickness of the organic mat, contributing to an increase in the depth to permafrost and the water table.

Representative pedon: about 3 inches (8 cm) of fibrous and partially decomposed organic material over 42 inches (107 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

ST31—Dackey, cool-Hogan, cool, complex, 0 to 4 percent slopes

Setting

Location: along the upper reaches of the South Branch, North Branch, and Main Stem—Landtype Association Map Units 135A1.V2 and 135A1.V7
Elevation: 2,350 to 2,550 feet (716 to 777 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This riparian unit occurs along meandering river channels; channel gradient is 16 to 50 feet/mile (3 to 9.5 m/km). Permafrost is discontinuous.

Composition

Major components:
Dackey, cool, and similar soils: 45 to 65 percent
Hogan, cool, and similar soils: 25 to 45 percent
Minor components:
Swedna soils on low flood plains: 0 to 5 percent
Kuslinad soils on stream terraces: 0 to 5 percent

Major Component Description

Dackey, cool
Landforms: flood plains
Position on landforms: low flood plain positions
Slope: 0 to 4 percent, plane or convex
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: somewhat poorly drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: 1.5 to 3.5 feet (0.5 to 1.1 m)
Available water capacity: mainly 4 inches (10.2 cm)
Ecological site: Loamy flood plains, moderately wet (Low willow/herb scrub)

Note:
Terrace height above the mean summer channel level ranges from 1.5 to 5 feet (0.5 to 1.5 m).

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

Hogan, cool
Landforms: flood plains
Position on landforms: high flood plain positions
Slope: 0 to 4 percent, plane or convex
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to permafrost
Drainage class: well drained
Dominant parent material: gravelly alluvium
Flooding: rare
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 3.6 inches (9.1 cm)
Ecological site: Loamy high flood plains (White spruce/willow open forest)

Note:
Terrace height above the mean summer channel level ranges from 5 to 12 feet (1.5 to 3.7 m).

Representative pedon: about 3 inches (8 cm) of fibrous organic material over 25 inches (64 cm) of stratified loamy alluvium—below this, permafrost

ST41—Maclaren-Sinona complex, 0 to 15 percent slopes
(Figure 5)

Setting

Location: along the middle reaches of the Main Stem—Landtype Association Map Unit 135A1.V3
Elevation: 1,950 to 2,450 feet (594 to 747 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This unit is dissected in places with shallow channels 4 to 10 feet (1.2 to 3 m) deep. Permafrost is generally absent.

Composition

Major components:
Maclaren and similar soils: 50 to 70 percent
Sinona and similar soils: 20 to 40 percent
Minor components:
Cryaquepts soils on escarpments: 0 to 5 percent
Klute soils on flood plains: 0 to 5 percent
Steeper soils: 0 to 5 percent

Major Component Description

Maclaren
Landforms: stream terraces
Position on landforms: all positions
Slope: 0 to 10 percent, plane or dissected
Slope length: 5 to 20 feet (1.5 to 6.1 m)
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: well drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 3.6 inches (9.1 cm)
Ecological site: Stream terraces (Spruce/shrub birch woodland)

Note:
Terrace height above the mean summer channel level ranges from 6 to 15 feet (1.8 to 4.6 m).

Representative pedon: about 3 inches (8 cm) of fibrous organic material over 18 inches (46 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

Sinona
Landforms: stream terraces
Position on landforms: all positions
Slope: 0 to 15 percent, plane or dissected
Slope length: 5 to 20 feet (1.5 to 6.1 m)
Depth class: very shallow—less than 10 inches (less than 25 cm) to sand and gravel
Drainage class: somewhat excessively drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 2.7 inches (6.9 cm)
Ecological site: Stream terraces (Spruce/shrub birch woodland)

Note:
Terrace height above the mean summer channel level ranges from 8 to 25 feet (2.4 to 7.6 m).

Representative pedon: about 2 inches (5 cm) of fibrous organic material over 9 inches (23 cm) of loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

ST411—Maclaren-Kuslinad complex, 0 to 15 percent slopes

Setting

Location: along the middle reaches of the West Fork—Landtype Association Map Unit 135A1.V3
Elevation: 2,000 to 2,450 feet (610 to 747 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:
This unit is dissected in places with channels 4 to 20 feet (1.2 to 6.1 m) deep. Permafrost is discontinuous.

Composition

Major components:
Maclaren and similar soils: 30 to 45 percent
Kuslinad, very wet, and similar soils: 20 to 40 percent
Kuslinad and similar soils: 15 to 35 percent
Minor components:
Hufman soils in depressions and oxbows: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent
Ponds and oxbows: 0 to 5 percent

Major Component Description

Maclaren
Landforms: stream terraces
Position on landforms: all positions
Slope: 0 to 15 percent, plane or dissected
Slope length: 5 to 20 feet (1.5 to 6.1 m)
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: well drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)
Available water capacity: mainly 3.6 inches (9.1 cm)
Ecological site: Stream terraces (Spruce/shrub birch woodland)

Note:
Terrace height above the mean summer channel level ranges from 6 to 20 feet (1.8 to 6.1 m).

Representative pedon: about 3 inches (8 cm) of fibrous organic material over 18 inches (46 cm) of stratified loamy alluvium—below this, sandy, gravelly, and cobbly alluvium to 60 inches (152 cm) or more

Kuslinad, very wet
Landforms: stream terraces
Position on landforms: all positions
Micro-relief: tussocks
Slope: 0 to 5 percent, plane or dissected
Slope length: 5 to 20 feet (1.5 to 6.1 m)
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: very poorly drained
Dominant parent material: stratified loamy alluvium
Flooding: none
Depth to seasonally high water table: 0 to 0.5 foot (0 to 0.2 m), perched
Ponding: 0 to 1 foot (0 to 0.3 m), long
Available water capacity: mainly 5.7 inches (14.5 cm)
Ecological site: Terraces, wet (Black spruce/closed sheath cottongrass woodland)

Note:

Terrace height above the mean summer channel level ranges from 12 to 20 feet (3.7 to 6.1 m). Ponding occurs in depressions between tussocks.

Representative pedon: about 8 inches (20 cm) of fibrous organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, permafrost

Kuslinad

Landforms: stream terraces
Position on landforms: all positions
Slope: 0 to 5 percent, plane
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: poorly drained
Dominant parent material: stratified loamy alluvium
Flooding: none
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m), perched
Available water capacity: mainly 5.7 inches (14.5 cm)
Ecological site: Stream terraces, frozen (Spruce/spruce muskeg sedge open forest)

Note:

Terrace height above the mean summer channel level ranges from 6 to 20 feet (1.8 to 6.1 m).

Representative pedon: about 8 inches (20 cm) of fibrous and partially decomposed organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, permafrost

ST441—Kuslinad-Dackey, cool, complex, 0 to 2 percent slopes

Setting

Location: along the middle reaches of the North Branch—Landtype Association Map Unit 135A1.V2
Elevation: 2,475 to 2,600 feet (754 to 792 m)
Mean annual precipitation: 18 to 21 inches (46 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: complex

Note:

This riparian unit occurs along meandering river channels; channel gradient is about 16 feet/mile (3.0 m/km). Permafrost is discontinuous.

Composition

Major components:
Kuslinad and similar soils: 40 to 65 percent
Dackey, cool, and similar soils: 15 to 30 percent
Minor components:
Hogan soils on high flood plains: 0 to 5 percent
Hufman soils in depressions and oxbows: 0 to 5 percent
Swedna, very poorly drained, soils on flood plains: 0 to 5 percent

Major Component Description

Kuslinad

Landforms: stream terraces
Position on landforms: all positions
Slope: 0 to 2 percent
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: poorly drained
Dominant parent material: stratified loamy alluvium
Flooding: none
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m), perched
Available water capacity: mainly 5.7 inches (14.5 cm)
Ecological site: Stream terraces, frozen (Spruce/spruce muskeg sedge open forest)

Note:

Terrace height above the mean summer channel level ranges from 6 to 25 feet (1.8 to 7.6 m).

Representative pedon: about 8 inches (20 cm) of fibrous and partially decomposed organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, permafrost

Dackey, cool

Landforms: flood plains
Position on landforms: all positions
Slope: 0 to 2 percent, plane or convex
Depth class: shallow and moderately deep—10 to 40 inches (25 to 102 cm) to sand and gravel
Drainage class: somewhat poorly drained
Dominant parent material: stratified loamy over gravelly alluvium
Flooding: occasional
Depth to seasonally high water table: 1.5 to 3.5 feet (0.5 to 1.1 m)
Available water capacity: mainly 4 inches (10.2 cm)
Ecological site: Loamy flood plains, moderately wet (Low willow/herb scrub)

Note:

Terrace height above the mean summer channel level ranges from 2 to 4.5 feet (0.6 to 1.4 m).

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 27 inches (69 cm) of stratified loamy alluvium—below this, sandy and gravelly alluvium to 60 inches (152 cm) or more

TS1—Cryaquepts, 4 to 25 percent slopes

Setting

Location: uplands throughout the area—Landtype Association Map Units 135A2.U1, 135A2.U2, 135A2.U3, and 135A4.M1
Elevation: 1,850 to 2,800 feet (564 to 853 m)
Mean annual precipitation: 15 to 21 inches (38 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: undifferentiated group

Note:
This unit is underlain by discontinuous permafrost.

Composition

Major components:
Cryaquepts and similar soils: 85 to 95 percent
Minor components:
Organic soils in depressions: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent
Cryaquepts, very wet, soils: 0 to 5 percent

Major Component Description

Landforms: hills and mountains
Position on landforms: footslopes and toeslopes
Slope: 4 to 25 percent, plane
Slope length: 150 to 500 feet (46 to 152 m)
Depth class: shallow to very deep—more than 10 inches (more than 25 cm) to permafrost
Drainage class: poorly drained
Dominant parent material: variable materials including lacustrine, alluvial, and colluvial deposits
Flooding: none
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m), perched
Available water capacity: mainly 6.3 inches (16 cm)
Ecological site: Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)

Representative pedon: about 4 inches (10 cm) of fibrous organic material over variable loamy and gravelly material of mixed origin to 60 inches (152 cm) or more

TS3—Mankomen peat, 0 to 15 percent slopes

Setting

Location: uplands in the southern part of the area—Landtype Association Map Unit 135A2.U1
Elevation: 1,900 to 2,100 feet (579 to 640 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days
Map unit type: consociation

Note:
This unit is underlain by discontinuous permafrost.

Composition

Major components:
Mankomen and similar soils: 85 to 95 percent
Minor components:
Klasi soils: 0 to 5 percent
Organic soils in depressions: 0 to 5 percent
Soils on steeper slopes: 0 to 5 percent

Major Component Description

Landforms: glaciolacustrine terraces
Position on landforms: all positions
Slope: 0 to 15 percent, plane
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: poorly drained
Dominant parent material: sandy glaciolacustrine deposits
Flooding: none
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m), perched
Available water capacity: mainly 6.9 inches (17.5 cm)
Ecological site: Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)

Representative pedon: about 15 inches (38 cm) of fibrous and partially decomposed organic material over 27 inches (69 cm) of sandy glaciolacustrine material—below this, permafrost

TS12—Chelina and Mendna soils, 6 to 20 percent slopes

Setting

Location: uplands throughout the area—Landtype Association Map Units 135A4.M1 and 135A2.U1
Elevation: 1,900 to 2,800 feet (579 to 853 m)
Mean annual precipitation: 15 to 21 inches (38 to 53 cm)
Frost-free period: 60 to 80 days
Map unit type: undifferentiated group

Note:
This unit is underlain by discontinuous permafrost.

Composition

Major components:
Chelina and similar soils: 15 to 80 percent
Mendna and similar soils: 15 to 80 percent
Minor components:
Soils on steeper slopes: 0 to 5 percent
Pippod soils: 0 to 5 percent
Organic soils in depressions: 0 to 5 percent

Major Component Description

Chelina
Landforms: hills and mountains
Position on landforms: footslopes and toeslopes
Slope: 6 to 20 percent, plane
Slope length: 400 to 1,200 feet (122 to 366 m)
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Dominant parent material: loess over loamy glaciolacustrine deposits
Flooding: none
Depth to seasonally high water table: more than 6 feet (more than 1.8 m)

Available water capacity: mainly 6 inches (15.2 cm)
Ecological site: Glaciolacustrine uplands (Spruce/shrub birch woodland)

Representative pedon: about 1 inch (3 cm) of fibrous organic material over 1 inch (3 cm) of silty loess—below this, loamy glaciolacustrine material to 60 inches (152 cm) or more

Mendna
Landforms: hills and mountains
Position on landforms: footslopes and toeslopes
Slope: 6 to 20 percent, plane
Slope length: 400 to 1,200 feet (122 to 366 m)
Depth class: very shallow to moderately deep—less than 40 inches (less than 102 cm) to permafrost
Drainage class: poorly drained
Dominant parent material: loamy glaciolacustrine deposits
Flooding: none
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m), perched
Available water capacity: mainly 7.7 inches (19.6 cm)
Ecological site: Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)

Representative pedon: about 9 inches (23 cm) of fibrous and partially decomposed organic material over 39 inches (99 cm) of loamy glaciolacustrine material—below this, permafrost

TS14—Cryaquepts and Cryaquepts, very wet, soils, 4 to 25 percent slopes

Setting

Location: uplands in the southern portion of the area—Landtype Association Map Units 135A2.U1 and 135A2.U2
Elevation: 1,900 to 2,600 feet (579 to 792 m)
Mean annual precipitation: 15 to 19 inches (38 to 48 cm)
Frost-free period: 60 to 80 days
Map unit type: undifferentiated group

Note:
This unit is underlain by discontinuous permafrost.

Composition

Major components:
Cryaquepts and similar soils: 20 to 80 percent
Cryaquepts, very wet, and similar soils: 20 to 80 percent
Minor components:
Soils on steeper slopes: 0 to 5 percent
Organic soils in depressions: 0 to 5 percent
Rock outcrops and occasional surface boulders: 0 to 5 percent

Major Component Description

Cryaquepts
Landforms: escarpments
Position on landforms: footslopes and toeslopes
Slope: 4 to 25 percent, plane
Slope length: 150 to 500 feet (46 to 152 m)
Depth class: shallow to very deep—more than 10 inches (more than 25 cm) to permafrost
Drainage class: poorly drained
Dominant parent material: variable materials including lacustrine, alluvial, and colluvial deposits
Flooding: none
Depth to seasonally high water table: 0.5 foot to 1.5 feet (0.2 to 0.5 m), perched
Available water capacity: mainly 6.3 inches (16 cm)
Ecological site: Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)

Representative pedon: about 4 inches (10 cm) of fibrous organic material over variable loamy and gravelly material of mixed origin to 60 inches (152 cm) or more

Cryaquepts, very wet
Landforms: escarpments
Position on landforms: footslopes and toeslopes
Micro-relief: tussocks
Slope: 4 to 25 percent, plane
Slope length: 150 to 500 feet (46 to 152 m)
Depth class: shallow to very deep—more than 10 inches (more than 25 cm) to permafrost
Drainage class: very poorly drained
Dominant parent material: variable materials including lacustrine, alluvial, and colluvial deposits
Flooding: none
Depth to seasonally high water table: 0 to 0.5 foot (0 to 0.2 m), perched
Ponding: 0 to 1 foot (0 to 0.3 m), long
Available water capacity: mainly 6.3 inches (16 cm)
Ecological site: Terraces, wet (Black spruce/closed sheath cottongrass woodland)

Note:
Ponding occurs in depressions between tussocks.

Representative pedon: about 7 inches (18 cm) of fibrous organic material over variable loamy and gravelly material of mixed origin to 60 inches (152 cm) or more

W--Water

Setting

Location: throughout the survey area.

Note:
This unit represents water bodies greater than 10 acres (greater than 4 ha).

Composition

Major components:
Water and similar soils: 90 percent

Minor components:
Ponded soils with emergent vegetation: 0 to 10 percent

VEGETATION RESOURCES

Delineations on the vegetation map in Volume 2 represent the vegetation map units of the Gulkana River area. A vegetation map unit is an area, or collective areas, on the landscape with a defined composition and pattern of vegetation cover types. Each map unit consists of one or more cover type components and differs in some respect from all other map units. A map unit component includes all areas (stands) within the map unit that fit the general range in characteristics of a specific vegetation cover type. Survey methods used to make the vegetation map are described in Appendix C.

Each delineation on the vegetation map has a **map unit symbol** to indicate the map unit and to link it to the corresponding map unit description on the following pages. Map unit symbols consist of a string of two letters and a number. The letters were assigned to indicate the general location and character of the map unit as follows:

EE(0-2)—escarpments characterized by steep slopes and areas of mass wasting; vegetation is highly variable depending on site properties such as aspect, slope gradient, and slope shape and position

FA(0-3)—flood plains in the alder zone; primarily the lower North and South Branches, the West Fork, and the Main Stem south of Canyon Rapids

FW(0-9)—flood plains in the willow zone; primarily north of Canyon Rapids on the Main Stem and the Middle Fork and the upper reaches of the North and South Branches

MM(0-3)—stream terrace and upland areas dominated by sedge wet meadow; common ponds and small lakes in areas occupied by these units

ST(0-7)—spruce woodland on stream terraces in both the alder and willow zones; permafrost and poorly drained soils prevalent

UB(0-3)—upland spruce woodland dominated by *Betula glandulosa* understory types; generally, extensive evidence of recent wildfire

UM(0-3)—upland spruce woodland dominated by *Carex lugens* understory types; permafrost and poorly drained soils prevalent

US(0-6)—dry cover types on uplands in which *Betula glandulosa* dominates the shrub layer and lichen and various xerophytic herbs dominate the ground layer; coarse textured soils prevalent; generally, extensive evidence of recent wildfires

UT(0-3)—upland spruce woodland and scrub dominated by *Eriophorum brachyantherum* understory types; permafrost and poorly drained soils prevalent

UW(0-1)—drainages in the uplands in which *Salix planifolia* is a dominant species; forest and scrub cover types

The map unit descriptions that follow identify both the **major components** (dominant cover types occurring in all delineations) and **minor components** (subordinate cover types not occurring in every delineation). Similar inclusions, cover types similar enough to be managed as part of the component, also are identified; however, they are generally of minor extent and represent only a small portion of the component. **Incidental occurrence** lists other cover types observed within the map unit, which are of limited

extent or incidental occurrence and usually dissimilar to the named components. Average percent composition across the entire range of the map unit is given for each component. For any specific delineation, actual composition may vary somewhat from the average.

Vegetation map units of the Gulkana River area, including the symbol, map unit name, and approximate acreage, are listed in Table 7. Common soils in each major component are listed in Table 8.

Vegetation Map Unit Descriptions

Cover types listed under “Major components” and “Minor components” are described in Appendix E.

EE0—Escarpments

Setting

Location: primarily along the Main Stem beginning just north of the canyon to Sourdough
Elevation: 1,900 to 2,500 feet (579 to 762 m)

Note:
This unit includes the north-south trending escarpments characteristic of the Main Stem. Slope aspect and gradient are highly variable and change frequently over relatively short distances, resulting in a wide range of growing conditions. Mass wasting is common on escarpments. Most escarpments are in the transition zone between the river corridor and the uplands.

Composition

Major components:
Spruce/shrub birch woodland: 35 percent
Sparsely vegetated escarpments: 20 percent
White spruce forest: 15 percent
Quaking aspen-white spruce forest: 15 percent
Minor components:
Spruce/alder woodland: 10 percent
Low shrub birch scrub: 5 percent

Component Notes

Spruce/shrub birch woodland
Similar inclusions: Spruce/lichen woodland
Principal soils: Cryorthents and Cryochrepts
Sparsely vegetated escarpments
Principal soils: Cryorthents and Cryochrepts
Other: This component occurs on steep and very steep, unstable slopes. Nearly barren areas with evidence of periodic mass wasting are included within this component.
White spruce forest
Principal soils: Cryorthents and Cryochrepts
Other: This component typically occurs on lower slope positions.
Quaking aspen-white spruce forest
Similar inclusions: Quaking aspen forest
Principal soils: Cryochrepts
Other: This component occurs on steep, convex slope shoulder and southerly aspects.

Spruce/alder woodland
Principal soils: Cryorthents and Cryochrepts
Low shrub birch scrub
Principal soils: Cryorthents and Cryochrepts

EE1—Escarpments (2)

Setting

Location: primarily along the Middle Fork, the lower North Branch, and the West Fork
Elevation: 2,000 to 2,500 feet (610 to 762 m)

Note:
This unit includes the east-west trending, north facing escarpments characteristic of the Middle and West Forks. Slope aspects are primarily northeast, north, and northwest. Slope gradient is highly variable. Areas of mass wasting are uncommon in this unit compared with the other escarpment units. Most escarpments are in the transition zone between the river corridor and the uplands.

Composition

Major components:
Spruce/shrub birch woodland: 55 percent
Low shrub birch scrub: 30 percent
Minor components:
Spruce/alder woodland: 10 percent
Incidental occurrence: 5 percent
Sparsely vegetated escarpments
Quaking aspen-white spruce forest

Component Notes

Spruce/shrub birch woodland
Similar inclusions: Spruce/spruce muskeg sedge open forest
Principal soils: Cryorthents and Cryochrepts
Low shrub birch scrub
Structure and composition: Tall *Salix* spp. are common to well-represented in most stands of this component.
Principal soils: Cryorthents and Cryochrepts
Other: This component is more prevalent at higher elevations.
Spruce/alder woodland
Principal soils: Cryorthents and Cryochrepts

EE2—Escarpments (3)

Setting

Location: primarily along the Middle Fork, the lower North Branch, and the West Fork
Elevation: 2,000 to 2,500 feet (610 to 762 m)

Note:
This unit includes the east-west trending, south facing escarpments characteristic of the Middle and West Forks. Slope aspects are primarily southeast, south, and southwest.

Slope gradient is highly variable. Mass wasting is common in this unit. Most escarpments are in the transition zone between the river corridor and the uplands.

Composition

Major components:
Spruce/shrub birch woodland: 35 percent
Sparsely vegetated escarpments: 30 percent
Spruce/lichen woodland: 15 percent
Quaking aspen-white spruce forest: 15 percent
Incidental occurrence: 5 percent
Spruce/alder woodland
White spruce forest

Component Notes

Spruce/shrub birch woodland
Similar inclusions: Low shrub birch scrub
Principal soils: Cryorthents and Cryochrepts
Sparsely vegetated escarpments
Principal soils: Cryorthents and Cryochrepts
Other: This component occurs on steep and very steep, unstable slopes. Nearly barren areas with evidence of periodic mass wasting are included in this component.
Spruce/lichen woodland
Similar inclusions: Low shrub birch/lichen scrub
Principal soils: Cryorthents and Cryochrepts
Quaking aspen-white spruce forest
Similar inclusions: Quaking aspen forest
Principal soils: Cryorthents and Cryochrepts

FA0—Tall thinleaf alder-feltleaf willow scrub : Balsam poplar/thinleaf alder open forest : White spruce/thinleaf alder open forest

Setting

Location: along the Main Stem from the canyon to Sourdough and along the mid portion of the West Fork
Elevation: 1,850 to 2,400 feet (564 to 732 m)

Note:
This unit is one of the most extensive units within the river corridor. This unit occurs on low and high flood plains and stands of each component are generally of small extent and intermixed with the other components.

Composition

Major components:
Tall thinleaf alder-feltleaf willow scrub: 20 percent
Tall thinleaf alder scrub: 15 percent
Balsam poplar/thinleaf alder open forest: 15 percent
White spruce/thinleaf alder open forest: 15 percent
Minor components:
Balsam poplar-white spruce/thinleaf alder open forest: 10 percent
White spruce/ericaceous shrub open forest: 10 percent

Tall feltleaf willow/alder scrub: 8 percent
Incidental occurrence: 7 percent
Sedge-grass riparian meadow
Sedge wet meadow
Sparsely vegetated alluvium
Low willow/herb scrub

Component Notes

Tall thinleaf alder-feltleaf willow scrub
Similar inclusions: Tall thinleaf alder/willow scrub
Principal soils: Dackey
Other: This component occurs adjacent to the channel on the low flood plains. Terrace height generally ranges from 2 to 4 feet (0.6 to 1.2 m) above the channel.
Tall thinleaf alder scrub
Principal soils: Dackey
Other: This component typically occurs between the Tall thinleaf alder-feltleaf willow scrub and the Balsam poplar/thinleaf alder forest components.
Balsam poplar/thinleaf alder open forest
Principal soils: Kluna, deep; Klute, moderately wet; and Dackey
Other: This component occurs above the alder-willow zone on slightly higher flood plains. Terrace height generally ranges from 3 to 6 feet (0.9 to 1.8 m) above the channel.
White spruce/thinleaf alder open forest
Principal soils: Hogan
Other: This component occurs on high flood plains generally from 5 to 8 feet (1.5 to 2.4 m) above the channel.
Balsam poplar-white spruce/thinleaf alder open forest
Soils: Kluna, deep; Klute, moderately wet; and Dackey
Other: This component occurs intermixed with the Balsam poplar/thinleaf alder forest component.
White spruce/ericaceous shrub open forest
Similar inclusions: Spruce/shrub birch woodland
Principal soils: Hogan
Other: This component typically occurs above the White spruce/thinleaf alder forest component as a narrow transition between high flood plains and stream terraces. Terrace height ranges from 6 to 10 feet (1.8 to 3 m) above the channel.
Tall feltleaf willow/alder scrub
Similar inclusions: Tall feltleaf willow scrub
Principal soils: Dackey and Kluna, frequently flooded
Other: This component typically occurs below the Tall thinleaf alder-feltleaf willow scrub component on the lowest flood plains between 1 to 3 feet (0.3 to 0.9 m) above the channel.

FA1—White spruce/thinleaf alder open forest

Setting

Location: high flood plains along the Main Stem from the canyon south to Sourdough
Elevation: 1,850 to 2,400 feet (564 to 732 m)

Composition

Major components:
White spruce/thinleaf alder open forest: 70 percent
Balsam poplar-white spruce/thinleaf alder open forest: 28 percent

Incidental occurrence: 2 percent
Sedge wet meadow

Component Notes

White spruce/thinleaf alder open forest
Soils: Hogan
Other: This component occurs on flood plains 4 to 8 feet (1.2 to 2.4 m) above the channel.
Balsam poplar-white spruce/thinleaf alder open forest
Similar inclusions: Balsam poplar/thinleaf alder open forest
Soils: Klute, moderately wet
Other: This component usually occurs on the edges of the flood plains closest to the channel.

FA2—Tall thinleaf alder/willow scrub : White spruce/thinleaf alder open forest : Sedge-grass riparian meadow

Setting

Location: high flood plains along the lower West Fork from about Fish Lake to the confluence with the Main Stem
Elevation: 1,900 to 2,000 feet (579 to 610 m)

Note:
The flood plains in this unit are very narrow, rapidly giving way to the adjoining stream terraces. The channel is relatively deeply incised; low flood plains are generally discontinuous and of small extent.

Composition

Major components:
Tall thinleaf alder/willow scrub: 30 percent
White spruce/thinleaf alder open forest: 20 percent
Sedge-grass riparian meadow: 20 percent
Minor components:
Tall thinleaf alder scrub: 15 percent
White spruce/ericaceous shrub open forest: 10 percent
Incidental occurrence: 5 percent
Balsam poplar-white spruce/thinleaf alder open forest
Sparsely vegetated alluvium

Component Notes

Tall thinleaf alder/willow scrub
Similar inclusions: Tall thinleaf alder-feltleaf willow scrub
Principal soils: Dackey
Other: This component occurs adjacent to the channel on low flood plains from 1 to 4 feet (0.3 to 1.2 m) above the channel.
White spruce/thinleaf alder open forest
Principal soils: Hogan
Other: This vegetation occurs on high flood plains generally from 4 to 8 feet (1.2 to 2.4 m) above the channel.
Sedge-grass riparian meadow
Principal soils: Swedna, very poorly drained

Other: This component occurs on low flood plains and steep river banks immediately adjacent to the channel.
Tall thinleaf alder scrub
Principal soils: Dackey
Other: This component occurs intermixed with the Tall thinleaf alder/willow scrub component.
White spruce/ericaceous shrub open forest
Similar inclusions: Spruce/shrub birch woodland
Principal soils: Hogan
Other: This component typically occurs above the White spruce/thinleaf alder forest component as a narrow transition between high flood plains and stream terraces. Terrace height ranges from 6 to 10 feet (1.8 to 3 m) above the channel.

FA3—Tall thinleaf alder/willow scrub : White spruce/ericaceous shrub open forest

Setting

Location: complex of low and high flood plains along the lower North and South Branches and the upper West Fork
Elevation: 2,150 to 2,400 feet (655 to 732 m)

Note:
Low flood plains in this unit are generally of small extent.

Composition

Major components:
Tall thinleaf alder/willow scrub: 40 percent
White spruce/ericaceous shrub open forest: 35 percent
Minor components:
Balsam poplar/thinleaf alder open forest: 8 percent
Tall thinleaf alder scrub: 7 percent
Incidental occurrence: 10 percent
White spruce/thinleaf alder open forest
Tall feltleaf willow/alder scrub
Low willow/water sedge scrub
Sedge-grass riparian meadow
Sparsely vegetated alluvium

Component Notes

Tall thinleaf alder/willow scrub
Similar inclusions: Tall thinleaf alder-feltleaf willow scrub
Principal soils: Dackey
Other: This component occurs adjacent to the channel on the low flood plains. Terrace height generally ranges from 2 to 4 feet (0.6 to 1.2 m) above the channel.
White spruce/ericaceous shrub open forest
Similar inclusions: Spruce/shrub birch woodland and Spruce/spruce muskeg sedge open forest
Principal soils: Hogan and Maclaren
Other: This component occurs on high flood plains generally from 5 to 15 feet (1.5 to 4.6 m) above the channel.

Balsam poplar/thinleaf alder open forest
Similar inclusions: Balsam poplar-white spruce/thinleaf alder open forest
Principal soils: Dackey
Other: Stands of this component are generally of small extent.
Tall thinleaf alder scrub
Principal soils: Dackey
Other: Stands of this component are generally of small extent.

FW0—White spruce/willow open forest : Low willow/herb scrub

Setting

Location: complex of low and high flood plains along the Middle Fork in the vicinity of Hungry Hollow Creek and along the Main Stem from the Middle Fork confluence to the canyon
Elevation: 2,400 to 2,500 feet (732 to 762 m)

Note:
Stands of each component are generally of small extent and intermixed with stands of the other components.

Composition

Major components:
White spruce/willow open forest: 50 percent
Low willow/herb scrub: 27 percent
Minor components:
Sedge-grass riparian meadow: 10 percent
Tall feltleaf willow scrub: 10 percent
Incidental occurrence: 3 percent
Sedge wet meadow
White spruce/ericaceous shrub open forest

Component Notes

White spruce/willow open forest
Principal soils: Kluna; Klute; Hogan, cool; and Dackey, cool
Other: This component occurs on the high flood plains. The soils usually have a thicker layer of fine textured alluvium and a deeper water table than those in the Low willow/herb scrub and Sedge-grass riparian meadow components.
Low willow/herb scrub
Principal soils: Dackey, cool, and Swedna
Other: This component typically occurs on lower flood plains than the White spruce/willow component.
Sedge-grass riparian meadow
Principal soils: Swedna, very poorly drained
Other: This component occurs primarily along the continuously wetted margin of the main channel. It also occurs in backwater areas and ephemeral channels.
Tall feltleaf willow scrub
Principal soils: Dackey, cool, and Swedna
Other: Stands of this component are generally of small extent and found in association with the Low willow/herb scrub component.

FW1—White spruce/willow open forest

Setting

Location: high flood plains and alluvial fans beginning just below the canyon along the Middle Fork to Canyon Rapids on the Main Stem
Elevation: 2,400 to 2,550 feet (731 to 799 m)

Note:
This unit typically occurs on high flood plains 4 to 8 feet (1.2 to 2.4 m) above the channel and above the willow zone.

Composition

Major components:
White spruce/willow open forest: 80 percent
Minor components:
Spruce/shrub birch woodland: 10 percent
Low willow/herb scrub: 5 percent
Incidental occurrence: 5 percent
Sedge-grass riparian meadow
Sedge wet meadow
White spruce/moss forest

Component Notes

White spruce/willow open forest
Structure and composition: Populus balsamifera occasionally is common, particularly in stands along the Middle Fork and near the confluence of the Middle Fork and Main Stem.
Similar inclusions: Spruce/willow woodland
Principal soils: Klute; Kluna; and Klute, occasionally flooded
Spruce/shrub birch woodland
Structure and composition: In this component, tall *Picea glauca* trees, which are beginning to die out, are being replaced by slower growing *Picea mariana* and *Picea glauca*.
Principal soils: Klute, cool, and Kluna
Other: This component occurs on the interior of high flood plains.
Low willow/herb scrub
Principal soils: Klute; Kluna; Klute, occasionally flooded; and Tangoe
Other: This component usually occurs on lower flood plain positions.

FW2—White spruce/willow open forest : Low willow/herb2 scrub

Setting

Location: complex of low and high flood plains along the mid and lower portions of the Middle Fork
Elevation: 2,450 to 2,500 feet (747 to 762 m)

Note:
In most places within this unit, the channel is deeply incised with steep banks; within 50 feet (15 m) or less of the channel, the high flood plains are from 5 to 15 feet (1.5 to 4.6 m) above the channel.

Composition

Major components:
White spruce/willow open forest: 50 percent
Low willow/herb2 scrub: 40 percent
Minor components:
Sedge-grass riparian meadow: 6 percent
Incidental occurrence: 4 percent
Tall feltleaf willow scrub

Component Notes

White spruce/willow open forest
Principal soils: Hogan, cool
Other: This component occurs on high flood plain positions and the interiors of meanders.
Low willow/herb2 scrub
Principal soils: Sankluna
Other: This component occurs on flood plain positions including the exterior of meanders and on point bars.
Sedge-grass riparian meadow
Principal soils: Swedna, very poorly drained
Other: This component is restricted to the lower margins of the steep stream banks and grades rapidly into the Low willow/herb scrub component.

FW3—Low willow/herb scrub : White spruce/willow open forest

Setting

Location: flood plains along the Middle Fork near Swede and Hungry Hollow Creeks and along Keg Creek on the North Branch.
Elevation: 2,350 to 2,550 feet (716 to 777 m)

Composition

Major components:
Low willow/herb scrub: 40 percent
White spruce/willow open forest: 40 percent
Minor components:
Tall feltleaf willow scrub: 13 percent
Sparsely vegetated alluvium: 5 percent
Incidental occurrence: 2 percent
Sedge-grass riparian meadow

Component Notes

Low willow/herb scrub
Principal soils: Tangoe, frequently flooded
Other: This component usually occurs immediately adjacent to the channel on low flood plains.
White spruce/willow open forest
Structure and composition: Stands of this component tend to be relatively young with medium height and diameter trees.
Principal soils: Klute, occasionally flooded, and Tangoe, occasionally flooded
Other: This vegetation generally occurs on the interior of meander bends on slightly higher flood plain positions than the associated Low willow/herb scrub component.

Tall feltleaf willow scrub
Principal soils: Tangoe, frequently flooded
Other: This component usually occurs as small stands immediately adjacent to the channel on flood plains.
Sparsely vegetated alluvium
Principal soils: Tangoe, wet
Other: This component usually occurs on low terraces and ridges on the flood plains.

FW4—White spruce/willow open forest : Low willow/herb scrub (2)

Setting

Location: the alluvial fan of Hungry Hollow Creek on the Middle Fork
Elevation: 2,500 to 2,575 feet (762 to 785 m)

Note:
Charred stumps, downed trees, and snags indicate the vegetation of this unit was burned by wildfire in the not too distant past. The lower edge of the fan is wetter from run-in and subsurface drainage.

Composition

Major components:
White spruce/willow open forest: 67 percent
Low willow/herb scrub: 33 percent

Component Notes

White spruce/willow open forest
Structure and composition: Stands of this component usually have a woodland canopy (less than 25 percent tree cover) with common to well-represented small saplings and seedlings in the understory. The lower edge of the fan is wetter from subsurface drainage and run-in; *Carex aquatilis* is well-represented in the understory.
Principal soils: Klute and Kluna
Low willow/herb scrub
Structure and composition: Seedlings and small saplings are well-represented to abundant.
Principal soils: Klute and Kluna

FW5—Willow scrub complex

Setting

Location: low flood plains along the upper Middle Fork and upper North Branch
Elevation: 2,550 to 2,875 feet (777 to 876 m)

Note:
Along the Middle Fork, this unit is relatively wide. Beaver activity has created a network of channels and ponds and apparently raised the water table throughout much of the area. Along the North Branch, this unit is very narrow, occurring immediately adjacent to the channel.

Composition

Major components:
Low willow/water sedge scrub: 50 percent
Low willow/herb scrub: 35 percent
Minor components:
Sedge-grass riparian meadow: 10 percent
Incidental occurrence: 5 percent
White spruce/willow open forest
Aquatic herbaceous in ponds

Component Notes

Low willow/water sedge scrub
Structure and composition: The water sedge layer of this component is very similar to Sedge-grass riparian meadow. In places where the willow layer becomes sparse, the distinction between this vegetation and Sedge-grass riparian meadow becomes arbitrary and transitional.
Principal soils: Swedna, high elevation
Low willow/herb scrub
Principal soils: Swedna, high elevation
Other: This vegetation occurs on somewhat higher microsites than the Low willow/water sedge scrub component. Moose browsing in many places has resulted in severe hedging and a browse line at 4 to 5 feet (1.2 to 1.5 m). Above this level, dead stems protrude to 7 feet (2.1 m) or more. The height of the browse line may also indicate average snow depth in winter.
Sedge-grass riparian meadow
Principal soils: Swedna, very poorly drained
Other: Even during the dry summer of 1994, ponded water covered the surface across most areas of this vegetation. Ponds and channels are frequent throughout.

FW6—Sedge-grass riparian meadow : Low willow/herb scrub

Setting

Location: low flood plains and isolated segments of high flood plains along the upper South Branch for about 3 miles (4.8 km) below Mud Lake
Elevation: 2,300 to 2,350 feet (701 to 716 m)

Note:

This unit occupies the narrow riparian zone adjacent to the channel. Much of the flood plain is less than 2 feet (less than 0.6 m) above the channel, and ponding or a water table near the surface is common in the Sedge-grass riparian meadow and Low willow/herb scrub components during the growing season.

Composition

Major components:
Sedge-grass riparian meadow: 45 percent
Low willow/herb scrub: 41 percent
Minor components:
White spruce/willow open forest: 14 percent

Component Notes

Sedge-grass riparian meadow
Structure and composition: This component includes both typical Sedge-grass riparian meadow dominated by *Carex aquatilis* and grassy meadow dominated by *Calamagrostis canadensis*.
Principal soils: Aquatna
Low willow/herb scrub
Principal soils: Aquatna
Other: This component usually occurs on slightly higher microsites and further back from the channel than the Sedge-grass riparian meadow component.
White spruce/willow open forest
Principal soils: Hogan, cool
Other: This type occurs on high flood plain positions.

FW7—Low willow/water sedge scrub

Setting

Location: low flood plains bordering the main channel and major side drainages along the upper Middle Fork
Elevation: 2,600 to 2,800 feet (792 to 853 m)

Composition

Major components:
Low willow/water sedge scrub: 60 percent
Low willow/herb scrub: 25 percent
Minor components:
White spruce/willow open forest: 13 percent
Incidental occurrence: 2 percent
Tall feltleaf willow scrub
Sedge-grass riparian meadow

Component Notes

Low willow/water sedge scrub
Structure and composition: The water sedge layer of this type is similar to the Sedge-grass riparian meadow type. In places where the willow layer becomes sparse, the distinction between this vegetation and Sedge-grass riparian meadow becomes arbitrary and transitional.
Principal soils: Swedna, high elevation, and Hisna
Low willow/herb scrub
Principal soils: Swedna, high elevation, and Hisna
Other: This type occurs on slightly higher microsites than the Low willow/water sedge scrub component.
White spruce/willow open forest
Principal soils: Hogan, cool
Other: This type occurs on high flood plain positions.

FW8—Willow scrub complex (2)

Setting

Location: low flood plains bordering the main channel below Dickey Lake and the flood plain on the alluvial fan of Hungry Hollow Creek
Elevation: 2,500 to 2,900 feet (762 to 884 m)

Note:
The gradient of the stream channel within this unit generally is relatively steep and nearly barren. Cobbly alluvium is exposed across much of the surface.

Composition

Major components:
Low willow/herb scrub: 40 percent
Tall feltleaf willow scrub: 35 percent
Minor components:
Sparsely vegetated alluvium: 12 percent
Sedge-grass riparian meadow: 10 percent
Incidental occurrence: 3 percent
Low willow/water sedge scrub
White spruce/willow open forest

Component Notes

Low willow/herb scrub
Principal soils: Tangoe, wet, occasionally flooded
Other: Much of the willow is slightly to severely hedged from moose browsing.
Tall feltleaf willow scrub
Principal soils: Tangoe, wet
Other: This vegetation usually occurs as small stands immediately adjacent to the main channel. The feltleaf willow is moderately to severely hedged from moose browsing; other willows are slightly to moderately hedged.
Sparsely vegetated alluvium
Principal soils: Tangoe, wet
Other: This component usually occurs on low terraces and ridges on the flood plains. The available water in the upper portions of the soils is extremely limited, except during periods of flooding, due to the lack of fines in the soil, excessive soil drainage, and a slightly elevated position.
Sedge-grass riparian meadow
Principal soils: Tangoe, wet, frequently flooded
Other: This vegetation typically forms small stands and narrow stringers adjacent to the main channel, in sloughs and abandoned channels, and elsewhere where ponding and a shallow water table persists much of the growing season. Sedge cover usually is sparse and mosses more abundant in depressions on the flood plain.

FW9—Low willow/herb scrub

Setting

Location: low flood plains along the Main Stem from the outlet of Paxson Lake to the Middle Fork confluence
Elevation: 2,450 to 2,550 feet (747 to 777 m)

Note:

The gradient of the stream channel within this unit is generally relatively steep, and boulders and cobbly alluvium are common adjacent to and within the main channel. Ponded areas and narrow, shallow channels back from the main channel are common near the confluence of the Main Stem and Middle Fork.

Composition

Major components:
Low willow/herb scrub: 70 percent
Minor components:
Low willow/water sedge scrub: 10 percent
Tall feltleaf willow scrub: 10 percent
Incidental occurrence: 10 percent
White spruce/willow open forest
Sedge-grass riparian meadow

Component Notes

Low willow/herb scrub
Structure and composition: White spruce trees and seedlings are common in many places at the lower end of this unit near the confluence of the Main Stem and Middle Fork.
Principal soils: Tangoe
Low willow/water sedge scrub
Principal soils: Tangoe, wet
Other: This type occurs primarily along the margins of channels and ponded areas.
Tall feltleaf willow scrub
Principal soils: Tangoe and Tangoe, wet
Other: Stands of this type are generally of small extent and limited to gravel bars and other sites adjacent to the main channel.

MM0—Sedge wet meadow

Setting

Location: lacustrine terraces, till plains, and stream terraces throughout the survey area
Elevation: 1,900 to 2,700 feet (579 to 823 m)

Note:

This unit occurs in topographic depressions and drainages, along the margins of ponds and lakes, and in sloughs and abandoned channels.

Composition

Major components:
Sedge wet meadow: 95 percent
Incidental occurrence: 5 percent
Low shrub birch-willow/water sedge scrub
Aquatic herbaceous in ponds

Component Notes

Sedge wet meadow
Principal soils: Hufman and Cryofibrists

MM1—Sedge wet meadow : Low shrub birch-willow/water sedge scrub

Setting

Location: lacustrine terraces, till plains, and stream terraces throughout the survey area
Elevation: 1,950 to 2,600 feet (594 to 792 m)

Note:
This unit occurs in topographic depressions and drainages, sloughs, and abandoned channels.

Composition

Major components:
Sedge wet meadow: 60 percent
Low shrub birch-willow/water sedge scrub: 35 percent
Incidental occurrence: 5 percent
Spruce/shrub birch woodland
Aquatic herbaceous in ponds

Component Notes

Sedge wet meadow
Principal soils: Cryofibrists and Hufman
Low shrub birch-willow/water sedge scrub
Principal soils: Pergelic Cryohemists and Cryofibrists

MM2—Spruce/shrub birch woodland : Sedge wet meadow : Low shrub birch-willow/water sedge scrub

Setting

Location: lacustrine terraces and occasionally till plains throughout the survey area
Elevation: 2,100 to 2,900 feet (640 to 884 m)

Note:
This unit includes a complex of topographic depressions, interconnecting channels, and low ridges and mounds.

Composition

Major components:
Spruce/shrub birch woodland: 52 percent
Sedge wet meadow: 26 percent
Low shrub birch-willow/water sedge scrub: 15 percent
Minor components:
Low shrub birch scrub: 7 percent

Component Notes

Spruce/shrub birch woodland
Similar inclusions: Spruce/lichen woodland and Black spruce/closed sheath cottongrass woodland

Principal soils: Pergelic Cryohemists, Mendna, and Klasi
Other: This component occurs on low ridges and mounds.
Sedge wet meadow
Principal soils: Cryohemists
Other: This component occurs in topographic depressions between ridges and mounds.
Low shrub birch-willow/water sedge scrub
Similar inclusions: Spruce/water sedge woodland
Principal soils: Ewan and Pergelic Cryohemists
Other: This component occurs in shallow, gently sloping drainages between topographic depressions.
Low shrub birch scrub
Similar inclusions: Low shrub birch/closed sheath cottongrass scrub
Principal soils: Pergelic Cryohemists, Mendna, and Klasi
Other: This component occurs on higher microsites in drainages and on ridges and mounds.

MM3—Low shrub birch scrub : Sedge wet meadow

Setting

Location: lacustrine terraces along the upper South Branch and North Branch and, rarely, on till plains along the Middle Fork
Elevation: 2,400 to 2,650 feet (732 to 808 m)

Note:
This unit consists of relatively high ridges and mounds and intervening basins and depressions. Local relief between ridges and depressions ranges from 10 to 25 feet (3 to 7.6 m) or more. Small lakes and ponds occupy many of the basins and these are often interconnected with shallow, gently sloping drainages.

Composition

Major components:
Low shrub birch scrub: 63 percent
Sedge wet meadow: 20 percent
Minor components:
Low shrub birch-willow/water sedge scrub: 15 percent
Incidental occurrence: 2 percent
Aquatic herbaceous in ponds

Component Notes

Low shrub birch scrub
Similar inclusions: Spruce/shrub birch woodland
Principal soils: Pergelic Cryohemists, dry
Other: This component occurs on the ridges and mounds.
Sedge wet meadow
Principal soils: Cryofibrists and Hufman
Other: This component occurs in basins and along the margins of ponds and lakes.
Low shrub birch-willow/water sedge scrub
Principal soils: Ewan and Pergelic Cryohemists
Other: This component occurs in drainages and on higher microsites within basins.

ST0—Black spruce/closed sheath cottongrass woodland : Spruce/shrub birch woodland : Sedge wet meadow

Setting

Location: stream terraces along the Main Stem south of the canyon and along the lower North and South Branches and the West Fork
Elevation: 1,850 to 2,500 feet (564 to 762 m)

Note:
In many locations, this map unit is associated with run-in areas from adjacent lacustrine terraces, escarpments, and alluvial fans.

Composition

Major components:
Black spruce/closed sheath cottongrass woodland: 50 percent
Spruce/shrub birch woodland: 30 percent
Minor components:
Sedge wet meadow: 8 percent
Low shrub birch-willow/water sedge scrub: 8 percent
Incidental occurrence: 4 percent
Low shrub birch scrub
White spruce/thinleaf alder forest
Spruce/willow woodland

Component Notes

Black spruce/closed sheath cottongrass woodland
Similar inclusions: Low shrub birch/closed sheath cottongrass scrub
Principal soils: Kuslinad, very wet, and Haggard
Spruce/shrub birch woodland
Similar inclusions: Spruce/spruce muskeg sedge open forest and White spruce/ericaceous shrub woodland
Principal soils: Kuslinad and Kusdry
Sedge wet meadow
Principal soils: Hufman
Other: This component occurs in depressions and shallow drainages. Stands of Low shrub birch-willow/water sedge scrub often occur in association with Sedge wet meadow.
Low shrub birch-willow/water sedge scrub
Principal soils: Hufman and Haggard
Other: This component occurs in shallow drainages.

ST1—Spruce/shrub birch woodland

Setting

Location: stream terraces throughout most of the river corridor
Elevation: 1,850 to 2,500 feet (564 to 762 m)

Note:
Delineations of this unit are generally of relatively small extent.

Composition

Major components:
Spruce/shrub birch woodland: 65 percent
Minor components:
Black spruce/closed sheath cottongrass woodland: 12 percent
White spruce/ericaceous shrub open forest: 8 percent
Low shrub birch scrub: 6 percent
Incidental occurrence: 9 percent
White spruce/thinleaf alder forest
Spruce/willow woodland

Component Notes

Spruce/shrub birch woodland
Similar inclusions: Spruce/spruce muskeg sedge open forest and Spruce/lichen woodland
Principal soils: Kuslinad and Maclaren
Black spruce/closed sheath cottongrass woodland
Principal soils: Kuslinad, very wet, and Mendna, very wet
Other: This component typically occurs on slightly wetter microsites than the Spruce/shrub birch woodland component.
White spruce/ericaceous shrub open forest
Principal soils: Hogan, Kusdry, Kuslinad, and Maclaren
Other: This component usually occurs along the transition between stream terraces and the slightly lower high flood plains.
Low shrub birch scrub
Similar inclusions: Low shrub birch/spruce muskeg sedge scrub
Principal soils: Maclaren and Kuslinad
Other: In most places, this component appears to be a burned stage of the Spruce/shrub birch woodland component.

ST2—Spruce/shrub birch woodland : Sedge wet meadow

Setting

Location: stream terraces along the Main Stem south of the canyon and along the lower West Fork to Sourdough
Elevation: 1,850 to 2,100 feet (564 to 640 m)

Composition

Major components:
Spruce/shrub birch woodland: 60 percent
Sedge wet meadow: 15 percent
Minor components:
Black spruce/closed sheath cottongrass woodland: 10 percent
Low shrub birch-willow/water sedge scrub: 5 percent
Incidental occurrence: 10 percent
Low shrub birch scrub
Spruce/willow woodland
White spruce/thinleaf alder forest
Aquatic herbaceous in ponds

Component Notes

Spruce/shrub birch woodland
Similar inclusions: Spruce/spruce muskeg sedge open forest and White spruce/ericaceous shrub woodland
Principal soils: Kuslinad
Other: This component occurs on terraces generally ranging from 5 to 10 feet (1.5 to 3 m) above the channel.
Sedge wet meadow
Principal soils: Hufman
Other: This component occurs in depressional areas and drainages.
Black spruce/closed sheath cottongrass woodland
Principal soils: Kuslinad, very wet
Other: This component typically occurs in wetter microsites than the Spruce/shrub birch woodland component.
Low shrub birch-willow/water sedge scrub
Principal soils: Hufman
Other: This component occurs in drainages in association with the Sedge wet meadow component.

ST3—Spruce/shrub birch woodland : Low shrub birch scrub : Sedge wet meadow

Setting

Location: high stream terraces along the lower Middle Fork to just below the confluence with the Main Stem
Elevation: 2,450 to 2,500 feet (747 to 762 m)

Note:
This unit occurs on stream terraces ranging from 10 to 20 feet (3 to 6.1 m) or more above the main channel. Ponds and small lakes are common throughout the area. Local relief between the terraces and ponds ranges from 5 to 20 feet (1.5 to 6.1 m) or more.

Composition

Major components:
Spruce/shrub birch woodland: 45 percent
Low shrub birch scrub: 18 percent
Sedge wet meadow: 15 percent
Minor components:
Black spruce/closed sheath cottongrass woodland: 12 percent
Low shrub birch-willow/water sedge scrub: 5 percent
Incidental occurrence: 5 percent
Aquatic herbaceous in ponds
Spruce/water sedge woodland

Component Notes

Spruce/shrub birch woodland
Similar inclusions: Spruce/spruce muskeg sedge open forest
Principal soils: Ganhona and Kuslinad
Low shrub birch scrub
Similar inclusions: Low shrub birch/spruce muskeg sedge scrub

Principal soils: Ganhona and Kuslinad
Other: In most places, this component appears to be a burned stage of the Spruce/shrub birch woodland component.
Sedge wet meadow
Principal soils: Hufman
Other: This component typically occurs along the margins of ponds and small lakes and in depressions and shallow drainages.
Black spruce/closed sheath cottongrass woodland
Similar inclusions: Low shrub birch/closed sheath cottongrass woodland
Principal soils: Kuslinad and Pergelic Cryohemists
Low shrub birch-willow/water sedge scrub
Principal soils: Pergelic Cryohemists and Hufman
Other: This component typically occurs in association with Sedge wet meadow in shallow drainages.

ST4—Black spruce/closed sheath cottongrass woodland : Spruce/shrub birch woodland : Spruce/lichen woodland

Setting

Location: stream terraces along the North Branch beginning at about Keg Creek to Fish Lake on the West Fork
Elevation: 2,000 to 2,400 feet (610 to 732 m)

Composition

Major components:
Black spruce/closed sheath cottongrass woodland: 35 percent
Spruce/shrub birch woodland: 30 percent
Spruce/lichen woodland: 20 percent
Minor components:
Sedge wet meadow: 7 percent
Low shrub birch-willow/water sedge scrub: 5 percent
Incidental occurrence: 3 percent
Low shrub birch scrub
Spruce/willow woodland

Component Notes

Black spruce/closed sheath cottongrass woodland
Similar inclusions: Shrub birch/closed sheath cottongrass scrub
Principal soils: Kuslinad, very wet
Spruce/shrub birch woodland
Similar inclusions: Spruce/spruce muskeg sedge open forest and White spruce/ericaceous shrub woodland
Principal soils: Kuslinad, Maclaren, and Kusdry
Spruce/lichen woodland
Principal soils: Maclaren
Other: This component usually occurs on higher terrace remnants and ridges.
Sedge wet meadow
Principal soils: Hufman
Other: This component occurs in depressions and shallow drainages.
Low shrub birch-willow/water sedge scrub
Principal soils: Kuslinad, very wet, and Hufman

Other: This component occurs in shallow drainages. Stands of Low shrub birch-willow/water sedge scrub are often found in association with Sedge wet meadow.

ST5—Spruce/shrub birch woodland : Low willow/herb scrub

Setting

Location: stream terraces and adjacent flood plains along the North Branch above Keg Creek
Elevation: 2,350 to 2,550 feet (716 to 777 m)

Note:
The channel through this unit is deeply incised, and most terraces range from 4 to 15 feet (1.2 to 4.6 m) or more above the channel. The upper portion of this unit is very narrow and stream sinuosity is high. Terrace segments are generally small and flood plains are nearly absent. The lower portion of this unit is considerably wider and channel sinuosity is less. Both the terraces and flood plains are more extensive.

Composition

Major components:
Spruce/shrub birch woodland: 50 percent
Low willow/herb scrub: 40 percent
Incidental occurrence: 10 percent
Black spruce/closed sheath cottongrass woodland
Low shrub birch scrub
Sedge-grass riparian meadow

Component Notes

Spruce/shrub birch woodland
Similar inclusions: White spruce/ericaceous shrub open forest, Spruce/spruce muskeg sedge open forest, and Spruce/lichen woodland
Principal soils: Hogan, cool, and Maclaren
Low willow/herb scrub
Principal soils: Dackey, cool
Other: This component is restricted to the flood plains and steep stream banks.

ST6—Low willow/herb scrub (2)

Setting

Location: low stream terraces along the upper Middle Fork for about 2 miles (3.2 km) immediately below Dickey Lake
Elevation: 2,800 to 2,870 feet (853 to 875 m)

Composition

Major components:
Low willow/herb scrub: 96 percent
Incidental occurrence: 4 percent
Sedge-grass riparian meadow
Low shrub birch scrub

Component Notes

Low willow/herb scrub
Structure and composition: Compared with Low willow/herb scrub elsewhere, this unit has fewer species and relatively sparse cover in the understory.
Principal soils: Ogtna
Other: In many places, moose browsing has resulted in severe hedging and a browse line at 3 to 3.5 feet (0.9 to 1.1 m). Above this level, dead stems protrude to 7 feet (2.1 m) or more. The height of the browse line may also indicate the average snow depth in winter.

ST7—Low shrub birch scrub

Setting

Location: stream terraces on the upper Middle Fork immediately below Dickey Lake and at the upper end of the North Branch
Elevation: 2,600 to 2,900 feet (792 to 884 m)

Note:
This unit is of limited distribution and extent, and delineations are generally small in size.

Composition

Major components:
Low shrub birch scrub: 96 percent
Incidental occurrence: 4percent
Low shrub birch-willow/water sedge scrub

Component Notes

Low shrub birch scrub
Similar inclusions: Low shrub birch/lichen scrub
Principal soils: Ogtna and Chelina

UB0—Spruce/shrub birch woodland (2)

Setting

Location: lacustrine terraces, till plains and hills, and mountain slopes—primarily in the northern and western portions of the survey area
Elevation: 2,000 to 2,850 feet (610 to 867 m)

Composition

Major components:
Spruce/shrub birch woodland: 85 percent
Minor components:
Low shrub birch scrub: 10 percent
Spruce/willow woodland: 5 percent

Component Notes

Spruce/shrub birch woodland
Similar inclusions: Spruce/spruce muskeg sedge open forest and Spruce/lichen woodland
Principal soils: Chelina, Mendna, Gadona, Klasi, Cryaquepts, and Cryochrepts
Low shrub birch scrub
Similar inclusions: Low shrub birch/spruce muskeg sedge scrub and Low shrub birch/lichen scrub
Principal soils: Chelina, Mendna, and Cryaquepts
Spruce/willow woodland
Principal soils: Mendna, Klasi, Cryaquepts

UB1—Spruce woodland : Low shrub birch-willow/water sedge scrub

Setting

Location: lacustrine terraces and occasionally hill slopes and toeslopes above the Main Stem
Elevation: 1,950 to 2,850 feet (594 to 869 m)

Note:
This unit occurs primarily in broadly concave and gently sloping areas with weakly developed drainage patterns.

Composition

Major components:
Spruce/shrub birch woodland: 40 percent
Spruce/spruce muskeg sedge open forest: 20 percent
Spruce/willow woodland: 15 percent
Low shrub birch-willow/water sedge scrub: 15 percent
Minor components:
Sedge wet meadow: 5 percent
Incidental occurrence: 5 percent
Low shrub birch scrub
Black spruce/closed sheath cottongrass woodland

Component Notes

Spruce/shrub birch woodland
Principal soils: Mendna, Cryaquepts, Chelina, and Gadona
Other: This component occurs on low ridges and mounds between shallow drainages.
Spruce/spruce muskeg sedge open forest
Principal soils: Mendna, Cryaquepts, Chelina, and Gadona
Other: This component occurs on low ridges and mounds between shallow drainages.
Spruce/willow woodland
Principal soils: Cryaquepts, Ewan, and Mendna
Other: This component occurs on the toeslopes of low ridges and mounds and elevated microsites within drainages.
Low shrub birch-willow/water sedge scrub
Principal soils: Ewan
Other: This component occurs in drainages.
Sedge wet meadow
Principal soils: Ewan
Other: This component occurs in drainages.

UB2—Spruce woodland : Tall alder scrub

Setting

Location: mountain slopes in scattered locations above the Main Stem between the Middle Fork confluence and the canyon
Elevation: 2,500 to 3,100 feet (762 to 945 m)

Note:
This unit occurs on steeper slopes, generally in the transition between the lower elevation lacustrine deposits and the higher till deposits.

Composition

Major components:
Tall alder scrub: 45 percent
Spruce/willow woodland: 25 percent
Spruce/shrub birch woodland: 25 percent
Minor components:
Rock outcrops: 5 percent

Component Notes

Tall alder scrub
Similar inclusions: Spruce/alder woodland
Principal soils: Nickolna
Spruce/willow woodland
Principal soils: Nickolna
Spruce/shrub birch woodland
Principal soils: Nickolna

UB3—Spruce/willow woodland : Spruce/shrub birch woodland

Setting

Location: steeper mountain slopes and toeslopes above the Middle Fork
Elevation: 2,500 to 2,700 feet (762 to 823 m)

Note:
This unit is of limited distribution and extent and is restricted to what appear to be discontinuous ground water seepage areas from adjacent uplands.

Composition

Major components:
Spruce/willow woodland: 50 percent
Spruce/shrub birch woodland: 45 percent
Minor components:
Low willow/herb scrub: 5 percent

Component Notes

Spruce/willow woodland
Principal soils: Humic Cryaquepts

Spruce/shrub birch woodland
Principal soils: Cryaquepts
Low willow/herb scrub
Principal soils: Humic Cryaquepts

UM0—Spruce/spruce muskeg sedge open forest

Setting

Location: lacustrine terraces and occasionally till plains and hills, mountain slopes, and escarpments; above the North Branch, South Branch, and West Fork
Elevation: 2,000 to 2,600 feet (610 to 792 m)

Composition

Major components:
Spruce/spruce muskeg sedge open forest: 50 percent
Spruce/shrub birch woodland: 25 percent
Minor components:
Black spruce/closed sheath cottongrass woodland: 10 percent
Low shrub birch scrub: 10 percent
Low shrub birch-willow/water sedge scrub: 5 percent

Component Notes

Spruce/spruce muskeg sedge open forest
Principal soils: Mendna, Cryaquepts, Chelina, and Klasi
Spruce/shrub birch woodland
Similar inclusions: Spruce/lichen woodland
Principal soils: Mendna, Chelina, and Cryaquepts
Black spruce/closed sheath cottongrass woodland
Similar inclusions: Low shrub birch/closed sheath cottongrass scrub
Principal soils: Swillna; Cryaquepts, very wet; and Mendna, very wet
Low shrub birch scrub
Principal soils: Mendna, Chelina, and Cryaquepts
Low shrub birch-willow/water sedge scrub
Similar inclusions: Low shrub birch scrub and Low shrub birch/lichen scrub
Principal soils: Swillna, Mendna, Cryaquepts, Chelina, and Klasi

UM1—Spruce woodland complex

Setting

Location: lacustrine terraces, till plains, and mountains slopes in the uplands and toeslopes adjacent to the river corridor; primarily above the Middle Fork, Main Stem, and lower West Fork
Elevation: 1,950 to 2,850 feet (594 to 869 m)

Composition

Major components:
Spruce/spruce muskeg sedge open forest: 45 percent
Spruce/shrub birch woodland: 40 percent

Minor components:
Spruce/willow woodland: 10 percent
Incidental occurrence: 5 percent
Low shrub birch scrub
Low shrub birch-willow/water sedge scrub
Black spruce/closed sheath cottongrass woodland

Component Notes

Spruce/spruce muskeg sedge open forest
Principal soils: Klasi and Cryaquepts
Spruce/shrub birch woodland
Similar inclusions: Spruce/lichen woodland
Principal soils: Gadona, Mendna, Chelina, Cryaquepts, and Klasi
Spruce/willow woodland
Principal soils: Klasi, Cryaquepts, Gadona, and Chelina
Other: This component occurs primarily on toeslopes and in wetter microsites elsewhere.

UM2—Low shrub birch scrub : Spruce woodland

Setting

Location: lacustrine terraces, and often mountain slopes, escarpments, and till plains and hills; primarily along the Middle Fork, Main Stem, and lower West Fork
Elevation: 1,900 to 2,800 feet (579 to 853 m)

Composition

Major components:
Low shrub birch scrub: 45 percent
Spruce/shrub birch woodland: 30 percent
Spruce/spruce muskeg sedge open forest: 20 percent
Incidental occurrence: 5 percent
Black spruce/closed sheath cottongrass woodland
Quaking aspen forest

Component Notes

Low shrub birch scrub
Similar inclusions: Low shrub birch/lichen scrub and Low shrub birch/spruce muskeg sedge scrub
Principal soils: Klasi, Gadona, Chelina, and Cobblank
Other: Charred snags, stumps, and woody debris indicate that this component has been burned by wildfire.
Spruce/shrub birch woodland
Similar inclusions: Spruce/lichen woodland
Principal soils: Klasi, Gadona, Chelina, and Cobblank
Spruce/spruce muskeg sedge open forest
Principal soils: Klasi, Gadona, Chelina, and Cobblank

US0—Low shrub birch scrub : Spruce/shrub birch woodland

Setting

Location: lacustrine terraces, till plains and hills, and mountain slopes; primarily in the northern and western portions of the survey area
Elevation: 2,400 to 3,000 feet (732 to 914 m)

Note:
Well-represented to abundant charred snags, stumps, and woody debris indicate that the majority of this unit has been burned by wildfire.

Composition

Major components:
Low shrub birch scrub: 60 percent
Spruce/shrub birch woodland: 40 percent

Component Notes

Low shrub birch scrub
Similar inclusions: Low shrub birch/lichen scrub
Principal soils: Chelina, Cobblank, and Mendna
Spruce/shrub birch woodland
Principal soils: Chelina, Cobblank, and Mendna
Other: This component includes unburned areas within the unit and areas of advanced woodland regeneration.

US1—Low shrub birch/lichen scrub : Sparsely vegetated outwash

Setting

Location: pitted glacial outwash plains and hills in the uplands around Dickey Lake
Elevation: 2,800 to 3,000 feet (854 to 915 m)

Note:
This unit continues for some miles to the west beyond the survey area.

Composition

Major components:
Low shrub birch/lichen scrub: 80 percent
Sparsely vegetated outwash: 15 percent
Incidental occurrence: 5 percent
Barren, sandy blowouts
Grassy meadows

Component Notes

Low shrub birch/lichen scrub
Similar inclusions: Low shrub birch scrub
Principal soils: Pippod, high elevation, and Chistna, high elevation
Other: The coarse textured, well to excessively drained soils associated with this component are well suited to shrub growth and lichens. Grasses and forbs are of minor

occurrence except in depressions and drainages.

Sparsely vegetated outwash

Structure and composition: This component consists of patches of lichen and moss with scattered dwarf shrubs and herbs. Nearly barren areas of outwash comprise 40 to 75 percent of the ground surface. Plant species are generally the same as those found in Low shrub birch/lichen scrub.

Principal soils: Pippod, high elevation

Other: This component occurs on dry, coarse textured, convex microsites on the crests and shoulders of short slopes.

US2—Low shrub birch/lichen scrub

Setting

Location: pitted glacial outwash plains and hills in the uplands around Dickey Lake, and mountain slopes above the confluence of the Middle Fork and Main Stem

Elevation: 2,800 to 3,500 feet (854 to 1,067 m)

Composition

Major components:

Low shrub birch/lichen scrub: 75 percent

Spruce/shrub birch woodland: 20 percent

Incidental occurrence: 5 percent

Sparsely vegetated outwash

Grassy meadows

Component Notes

Low shrub birch/lichen scrub

Similar inclusions: Low shrub birch scrub

Principal soils: Pippod, high elevation; Chistna, high elevation; and Cobblank, cool

Other: The coarse textured, well to excessively drained soils associated with this component are well suited to shrub growth and lichens. Grasses and forbs are of minor occurrence except in depressions and drainages.

Spruce/shrub birch woodland

Principal soils: Pippod, high elevation; Chistna, high elevation; and Cobblank

Other: This component occurs primarily at lower elevations along the edge of the unit.

US3—Quaking aspen-white spruce forest : Spruce/shrub birch woodland

Setting

Location: outwash and strandline remnants on lacustrine terraces above the lower West Fork and Main Stem to Sourdough

Elevation: 1,900 to 2,450 feet (579 to 747 m)

Note:

Delineations of this unit typically occur as isolated, scattered areas of small extent. Stumps, snags, and charred downfall indicate most delineations have been burned by wildfire.

Composition

Major components:
Quaking aspen-white spruce forest: 45 percent
Spruce/shrub birch woodland: 40 percent
Minor components:
Spruce/lichen woodland: 10 percent
Incidental occurrence: 5 percent
Low shrub birch scrub
Spruce/alder woodland

Component Notes

Quaking aspen-white spruce forest
Principal soils: Chistna, Pippod, and Mendna
Other: Stands of this component appear to have developed directly following burning.
Spruce/shrub birch woodland
Structure and composition: Quaking aspen snags and downfall are common in many stands of this component.
Principal soils: Chistna, Pippod, and Mendna
Spruce/lichen woodland
Principal soils: Chistna, Pippod, and Mendna

US4—Spruce woodland complex (2)

Setting

Location: outwash and strandline remnants on lacustrine terraces and high stream terraces along the upper Main Stem and mid West Fork
Elevation: 2,200 to 2,600 feet (671 to 792 m)

Note:
Delineations of this unit are generally of small to moderate extent in scattered locations.

Composition

Major components:
Spruce/lichen woodland: 50 percent
Spruce/shrub birch woodland: 30 percent
Low shrub birch/lichen scrub: 15 percent
Minor components:
Quaking aspen-white spruce forest: 5 percent

Component Notes

Spruce/lichen woodland
Principal soils: Chistna
Other: Most lichen growth, except where protected by dense shrub cover, appears to be moderately to occasionally heavily grazed by caribou. Caribou pellet groups are common to well-represented throughout most stands of this component.
Spruce/shrub birch woodland
Principal soils: Chistna
Low shrub birch/lichen scrub
Principal soils: Chistna

Quaking aspen-white spruce forest
Principal soils: Chistna, Pippod, and Mendna
Other: Stands of this component appear to have developed directly following burning.

US5—Low shrub birch/lichen scrub (2)

Setting

Location: alluvial fans in the vicinity of Swede Creek and Hungry Hollow Creek on the Middle Fork
Elevation: 2,450 to 2,700 feet (747 to 823 m)

Note:
This unit occurs primarily on the lower, outer portions of the fans.

Composition

Major components:
Low shrub birch/lichen scrub: 65 percent
Spruce/shrub birch woodland: 25 percent
Minor components:
Low shrub birch scrub: 10 percent

Component Notes

Low shrub birch/lichen scrub
Principal soils: Pippod and Clarena
Spruce/shrub birch woodland
Principal soils: Pippod and Clarena
Low shrub birch scrub
Principal soils: Pippod and Clarena

US6—Spruce woodland complex (3)

Setting

Location: alluvial fans in the vicinity of Swede Creek and Hungry Hollow Creek on the Middle Fork
Elevation: 2,450 to 2,700 feet (747 to 823 m)

Note:
This unit generally occurs on the upper and inner portions of the fans.

Composition

Major components:
Spruce/lichen woodland: 50 percent
Spruce/shrub birch woodland: 40 percent
Minor components:
Low shrub birch/lichen scrub: 10 percent

Component Notes

Spruce/lichen woodland
Principal soils: Pippod and Clarena
Spruce/shrub birch woodland
Principal soils: Pippod and Clarena
Low shrub birch/lichen scrub
Similar inclusions: Low shrub birch scrub
Principal soils: Pippod and Clarena

UT0—Spruce woodland : Low shrub birch-willow/water sedge scrub (2)

Setting

Location: lacustrine terraces above the West Fork and lower Main Stem
Elevation: 1,850 to 2,400 feet (564 to 732 m)

Note:
This unit occurs primarily in broadly concave areas with weakly developed drainage patterns.

Composition

Major components:
Black spruce/closed sheath cottongrass woodland: 45 percent
Spruce/spruce muskeg sedge open forest: 35 percent
Minor components:
Sedge wet meadow: 10 percent
Low shrub birch-willow/water sedge scrub: 7 percent
Incidental occurrence: 3 percent
Spruce/willow woodland

Component Notes

Black spruce/closed sheath cottongrass woodland
Similar inclusions: Low shrub birch/closed sheath cottongrass scrub
Principal soils: Klasi, very wet; Pergelic Cryohemists; and Mendna, very wet
Other: This component occurs on gently sloping to slightly concave plains.
Spruce/spruce muskeg sedge open forest
Similar inclusions: Spruce/shrub birch woodland
Principal soils: Klasi, Mendna, and Cryaquepts
Other: This component occurs on low ridges and mounds.
Sedge wet meadow
Principal soils: Ewan and Pergelic Cryohemists
Other: This component occurs in drainages.
Low shrub birch-willow/water sedge scrub
Similar inclusions: Spruce/water sedge woodland
Principal soils: Ewan and Pergelic Cryohemists
Other: This component occurs in drainages.

UT1—Spruce woodland : Low shrub birch-willow/water sedge scrub (3)

Setting

Location: lacustrine terraces adjacent to the main channel along upper North Branch
Elevation: 2,500 to 2,650 feet (762 to 808 m)

Note:
This unit occurs on nearly level areas with undulating micro-topography and weakly developed drainage patterns. Ponds and small lakes are common throughout the area.

Composition

Major components:
Black spruce/closed sheath cottongrass woodland: 45 percent
Spruce/shrub birch woodland: 20 percent
Low shrub birch-willow/water sedge scrub: 20 percent
Minor components:
Sedge wet meadow: 7 percent
Incidental occurrence: 8 percent
Low shrub birch scrub
Aquatic herbaceous in ponds

Component Notes

Black spruce/closed sheath cottongrass woodland
Similar inclusions: Low shrub birch/closed sheath cottongrass scrub
Principal soils: Mendna, very wet, and Pergelic Cryohemists
Other: This component occurs on nearly level to slightly concave plains.
Spruce/shrub birch woodland
Similar inclusions: Spruce/spruce muskeg sedge open forest
Principal soils: Mendna
Other: This component occurs on low ridges and mounds.
Low shrub birch-willow/water sedge scrub
Principal soils: Cryofibrists, Ewan, and Pergelic Cryohemists
Other: This component occurs in drainages.
Sedge wet meadow
Principal soils: Cryofibrists
Other: This component occurs in depressions and along the margins of ponds and lakes.

UT2—Spruce woodland complex (4)

Setting

Location: lacustrine terraces and occasionally stream terraces above the South Branch
Elevation: 2,400 to 2,450 feet (732 to 747 m)

Note:
The primary micro-relief within this unit is the result of frost action that has created frost mounds up to 30 inches (76 cm) high and about 12 feet (3.7 m) between summits.

Composition

Major components:
Black spruce/closed sheath cottongrass woodland: 60 percent
Spruce/shrub birch woodland: 30 percent
Incidental occurrence: 10 percent
Sedge wet meadow
Low shrub birch-willow/water sedge scrub

Component Notes

Black spruce/closed sheath cottongrass woodland
Similar inclusions: Low shrub birch/closed sheath cottongrass scrub
Principal soils: Swillna; Klasi, very wet; and Kuslinad, very wet
Other: This component occurs on and between frost mounds.
Spruce/shrub birch woodland
Similar inclusions: Spruce/spruce muskeg sedge open forest
Principal soils: Swillna, thin surface; Klasi; and Kuslinad
Other: This component occurs primarily on the summits and sides of frost boils.

UT3—Black spruce/closed sheath cottongrass woodland : Sedge wet meadow

Setting

Location: lacustrine terraces in scattered, isolated locations above the West Fork and Middle Fork
Elevation: 2,000 to 2,750 feet (610 to 838 m)

Note:
This unit occurs in broadly concave and level areas with peat mounds. Local relief between peat mounds and depressions ranges from 1 to 5 feet (0.3 to 1.5 m) or more.

Composition

Major components:
Black spruce/closed sheath cottongrass woodland: 70 percent
Sedge wet meadow: 15 percent
Minor components:
Spruce/shrub birch woodland: 10 percent
Low shrub birch-willow/water sedge scrub: 5 percent

Component Notes

Black spruce/closed sheath cottongrass woodland
Similar inclusions: Low shrub birch/closed sheath cottongrass scrub
Principal soils: Pergelic Cryohemists, dry
Other: This component occurs on elevated peat mounds.
Sedge wet meadow
Principal soils: Cryofibrists
Other: This component occurs in depressions and drainages between mounds and on the margins of ponds.
Spruce/shrub birch woodland
Similar inclusions: Spruce/spruce muskeg sedge open forest

Principal soils: Mendna
Other: This component occurs on low ridges and mounds primarily on mineral soils.
Low shrub birch-willow/water sedge scrub
Principal soils: Pergelic Cryohemists and Cryofibrists
Other: This component occurs in depressions and drainages between mounds.

UW0—White spruce/willow open forest : Low willow/herb scrub (3)

Setting

Location: narrow flood plains in upland drainages throughout the survey area
Elevation: 1,900 to 2,700 feet (579 to 823 m)

Note:
This unit includes small side streams and drainages that cross upland areas and drain onto stream terraces or into the main channel.

Composition

Major components:
White spruce/willow open forest: 50 percent
Low willow/herb scrub: 30 percent
Minor components:
Low shrub birch scrub: 10 percent
Incidental occurrence: 10 percent
Tall feltleaf willow scrub
Riparian meadow
Low willow/water sedge scrub

Component Notes

White spruce/willow open forest
Principal soils: not described
Other: This component occurs on flood plains.
Low willow/herb scrub
Principal soils: not described
Other: This component occurs on flood plains.
Low shrub birch scrub
Principal soils: not described
Other: This component occurs on stream terraces.

UW1—Low shrub birch-willow/water sedge scrub

Setting

Location: narrow, shallow drainages on lacustrine terraces and occasionally high stream terraces throughout the survey area
Elevation: 1,900 to 2,800 feet (579 to 853 m)

Note:
This unit includes small side streams and drainages that cross upland areas and drain onto wet meadows, lakes and ponds, and occasionally onto stream terraces or into the main channel.

Composition

Major components:
Low shrub birch-willow/water sedge scrub: 75 percent
Sedge wet meadow: 15 percent
Incidental occurrence: 10 percent
Low willow/herb scrub
Low shrub birch scrub

Component Notes

Low shrub birch-willow/water sedge scrub
Principal soils: Ewan and Pergelic Cryohemists
Other: Ponded water usually covers much of the ground surface; slow moving water occurs in poorly defined drainage channels.
Sedge wet meadow
Principal soils: Cryofibrists
Other: This component occurs in depressions and drainages on the margins of small ponds.

W—Open water : Aquatic herbaceous

Setting

Location: throughout the survey area
Elevation: 1,900 to 2,900 feet (579 to 884 m)

Composition

Major components:
Open water: 65 percent
Aquatic herbaceous: 25 percent
Minor components:
Sedge wet meadow: 10 percent

Component Notes

Open water
Other: Open water consists of deep water areas in ponds and lakes without significant submerged or emergent vegetation.
Aquatic Herbaceous
Structure and composition: This component includes a variety of aquatic plant communities including Pondlily, Burreed, and Fresh Pondweed (*Viereck et al. 1992*), and possibly other fresh water herbaceous and marsh types growing in shallow water ponds and the near-shore areas of larger lakes.
Principal soils: not described
Other: This component occurs in shallow, near-shore areas.
Sedge wet meadow
Principal soils: Cryofibrists
Other: This component occurs in narrow bands along the shores of ponds and lakes.

Part 3—Use and Management

INTRODUCTION

This section provides soil interpretations for recreational uses, and suitability ratings of major vegetation cover types for selected wildlife species and habitat elements. Soil properties and interpretive soil groups that may be useful in developing additional land use interpretations also are included.

RECREATIONAL DEVELOPMENT

Table 9 lists limitations that affect the suitability of soils for recreational uses. Guidelines for interpreting data for “All terrain vehicles” and “Paths and trails” are based on standard criteria provided in the National Soil Survey Handbook (*Soil Survey Staff 1996c*). Local criteria were developed to provide interpretations for “Camp areas (primitive).” Ratings are based on restrictive soil features such as wetness, slope, and texture of the surface layer. Susceptibility to flooding also is considered. Although important in evaluating a site, location and accessibility of the area; the size and shape of the area and its scenic quality; vegetation and the ability of the soil to support vegetation; and access to water were not considered in the ratings. In planning developed recreation facilities, on-site assessment of the height, duration, intensity, and frequency of flooding is essential. However, soils subject to flooding generally do not affect primitive recreational use along the Gulkana.

In Table 9, the degree of soil limitation is expressed as *slight*, *moderate*, or *severe*. *Slight* means that the soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitation can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

Primitive camp areas require little site preparation other than clearing brush and selecting level tent sites. Heavily used areas may require the installation of pit toilets to reduce waste impacts. Camp areas are subject to heavy foot traffic. The best soils for primitive camp areas have mild slopes and are not wet. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Favorable soils for pit toilet sites are well drained, permafrost free, have moderate or moderately rapid percolation rates, and are not frequently flooded.

All terrain vehicle trails and paths and trails for hiking and horseback riding are trails across the natural soil surface. They are not vegetated or artifically surfaced, and they should require little or no cutting and filling. Soils are rated based on the properties that influence erodibility, revegetation, trafficability, and dustiness. The best soils have gentle or moderate slopes, few or no rock fragments on the surface, are not wet, remain firm after rain, are not dusty when dry, and are not subject to flooding more than once a year during the period the use.

WILDLIFE HABITAT

Wildlife habitat encompasses the entire complex of physical, biological, and environmental features of the landscape. Habitat elements can consist of plant communities, specific sites, water types, and a multitude of other landscape features. Specific habitat requisites usually are related to the seasonal or life-cycle requirements of a particular species—for example, moose winter range or waterfowl nesting areas.

Within a limited geographic area or range of landscape and environmental factors, the diversity and quality of wildlife habitat are determined, in part, by the kinds and interspersion of vegetation cover types. Vegetation provides food for herbivores and omnivores, thermal and hiding cover, nesting and denning sites and materials, and other specific habitat features. In many cases, a single vegetation cover type provides specific habitat requisites. Generally, however, a mosaic of geographically associated cover types provides the best habitat requisite.

Important characteristics of vegetation cover types include species composition and age class distribution, vertical and horizontal structure and cover, and the occurrence of features such as snags or rotting logs.

Suitability ratings for selected wildlife species and habitat elements are listed in Table 10. Ratings are assigned to the vegetation cover types based on plant species composition and structure and Habitat Suitability Index (HSI) values developed by the U.S. Fish and Wildlife Service.

Regardless of the suitability of the vegetation, non-vegetative habitat requisites can affect the suitability of the habitat. Many habitat features not related to vegetation are described in, or can be inferred from, the “Ecological Site Descriptions” in Appendix F. Successional pathways and relationships between vegetation cover types, potential progressive and retrogressive changes in site properties, and landform and soil characteristics also are described in the ecological site descriptions. This information, in conjunction with the habitat suitability ratings, digital vegetation and soils maps, and associated attribute data, can be used to develop more complex interpretations and models concerning long- and short-term changes and trends in wildlife habitat resulting from vegetation succession, drastic disturbances, or management activities.

SOIL PROPERTIES AND INTERPRETIVE GROUPS

Engineering Index Properties

Table 11 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 feet (1.5 m).

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series, Higher Taxa, and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of

particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*American Society for Testing and Materials 1993*), and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*1970*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches (less than 8 cm) in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches (less than 8 cm) in diameter is classified in one of seven groups (from A-1 through A-7) on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 10 inches (25 cm) in diameter and 3 to 10 inches (8 to 25 cm) in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches (less than 8 cm) in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 12 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the study area. The estimates are based on field observation and on test data from similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the series descriptions in this survey.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. The estimated clay content of each major soil layer is

given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3-bar moisture tension. Weight is determined after drying the soil at 105°C. In Table 12, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates presented indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties that influence available water capacity include the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants for wildlife habitat. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on field tests.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly when clay minerals interact with water, and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K are 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cleared areas. The groups indicate the susceptibility of soil to wind erosion. Soils are grouped according to the following distinctions:

Group 1 : 1 to 9 percent dry soil aggregates. These soils are very highly erodible.

Group 2 : 10 to 24 percent dry soil aggregates. These soils are highly erodible.

Groups 3 and 4 : 25 to 40 percent dry soil aggregates. These soils are moderately erodible.

Group 5 : 41 to 44 percent dry soil aggregates. These soils are moderately erodible.

Group 6 : 45 to 50 percent dry soil aggregates. These soils are slightly erodible.

Group 7 : more than 50 percent dry soil aggregates and fibric material. These soils are slightly erodible.

Group 8 : wet or stony soils not normally subject to wind erosion. Grouping is based on soil properties (i.e. armor) not management.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In Table 12 the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Physical and Chemical Analysis of Selected Soils

The results of physical and chemical analysis of several typical pedons in the survey area are given in Tables 13 and 14. The data are for soils sampled at carefully selected sites. Unless otherwise indicated, the pedons are representative of the taxonomic class; however, the horizon designations may differ slightly from the typical soil profile described in the section "Soil Series, Higher Taxa, and Their Morphology." The National Soil Survey Laboratory in Lincoln, Nebraska analyzed soil samples.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the lists that follow. The codes in parentheses refer to published methods in the Soil Survey Laboratory Methods Manual (*Soil Survey Staff 1996a*).

Table 13 procedures:

Sand=(0.05-2.0 milimeters fraction) weight percentages of material less than 2 millimeters (3A1)

Silt=(0.002-0.05 millimeter fraction) pipette extraction, weight percentages of all material less than 2 millimeters (3A1)

Clay=(fraction less than 0.002 millimeter) pipette extraction, weight percentages of material less than 2 millimeers (3A1)

Water retained=pressure extraction, percentage of ovendry weight of less than 2 millimeters material; 1/3 bar (4B1), 15 bars (4B2)

Water retention difference=between 1/3 and 15 bars for whole soil (4C1)

Bulk density=of less than 2 millimeters material, saran-coated clods field moist (4A1a), 1/3 bar (4A1d), ovendry (4A1h)

Table 14 procedures:

Cation-exchange capacity=sum of cations (5A3a)

Cation-exchange capacity=ammonium acetate, pH 7.0, steam distillation (5A8b)

Reaction (pH)=1:1 water dilution (8C1f)

Reaction (pH)=calcium chloride (8C1f)

Organic carbon=wet combustion; Walkley-Black modified acid-dichromate, ferric sulfate titration (6A1c)

Total nitrogen=Kjeldahl (6B3)

Extractable acidity=barium chloride-triethanolamine IV (6H5a)

Extractable cations (bases)=ammonium acetate pH 7.0, atomic absorption; calcium (6N2e), magnesium (6O2d), sodium (6P2b), potassium (6Q2b)

Soil Features, Hydric Soils, and Water Features

Tables 15, 16, and 17 give estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Soil Features

In Table 15, *depth to bedrock* is given if bedrock is within a depth of 60 inches. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from desiccation, shrinkage, and oxidation of organic material following drainage. Subsidence takes place gradually, usually over a period of several years. Table 15 shows the expected initial subsidence, which usually is a result of drainage, and annual subsidence, which usually is a result of oxidation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty soils that have a high water table in winter are the most susceptible to frost action. Well drained or very sandy soils are the

least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

A *low* potential for frost action indicates that the soil is rarely susceptible to the formation of ice lenses; a *moderate* potential indicates that the soil is susceptible to formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength; and a *high* potential indicates that the soil is highly susceptible to formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil.

Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Hydric Soils

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and hydrology (*Cowardin et al. 1979; Environmental Laboratory 1987; National Research Council 1995; Tiner 1985*). Criteria for each of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (*Federal Register 1994*). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. However, in order to determine whether a specific soil is a hydric soil or nonhydric soil more specific information, such as information about the depth and duration of the water table, is needed. Criteria which identify those estimated soil properties unique to hydric soils have been established (*Federal Register 1995*). These criteria are used to identify a phase of a soil series that normally is associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" and “Keys to Soil Taxonomy” (*Soil Survey Staff 1975, 1996b*) and in the "Soil Survey Manual" (*Soil Survey Division Staff 1993*).

If soils are wet for a long enough period to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators that can be used to make on-site determinations

of hydric soils in the Gulkana Soil-Vegetation Survey Area are specified in "Field Indicators of Hydric Soils in the United States" (*U.S. Department of Agriculture 1996*).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches (51 cm). This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described as deep as necessary to understand the redoximorphic processes. Then, using the completed soil description, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if one or more of the approved indicators is present.

This survey can be used to locate probable areas of hydric soils. Table 16 indicates the hydric soil status for each map unit. Each dominant soil component, as well as each inclusion, is rated. The criteria used to rate each soil component and inclusion is also given. This information can help in planning land uses; however, on-site investigation is recommended to determine the hydric soils on a specific site.

Water Features

Hydrologic soil groups are used to estimate runoff from precipitation. The soil properties that affect runoff are those that influence the minimum rate of infiltration in a bare soil after prolonged wetting and when the soil is not frozen. These properties include the depth to a seasonally high water table, intake rate, permeability after prolonged wetting, and depth to a very slowly permeable layer. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

In the definitions of the hydrologic soil groups, the infiltration rate is the rate at which water enters the soil at the surface and is controlled by surface conditions. The transmission rate is the rate at which water moves through the soil and is controlled by properties of the soil layers.

In Table 17, the four hydrologic soil groups are:

Group A : Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B : Soils having a moderate infiltration rate (moderately low runoff potential) when thoroughly wet. These consist mainly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures and moderately slow to moderately rapid rates of water transmission.

Group C : Soils having a slow infiltration rate (moderately high runoff potential) when thoroughly wet. These consist mainly of soils with a layer that impedes downward movement of water, soils with moderately fine to fine texture, soils with slow infiltration due to salts or alkali, or soils with moderate water tables.

Group D : Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanently high water table, soils that have a clay pan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Frequency, duration, and probable dates of occurrence given in Table 17 are estimated. Frequency is expressed as *none, rare, occasional*, and *frequent*. *None* means that flooding is not probable; rare that it is unlikely but possible under unusual conditions; *occasional* that it occurs, on the average, once or less in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months—April-June, for example, means that flooding can occur during April, May, or June.

The information on flooding is based on evidence in the soil profile and local information about the extent and level of flooding and the relationship of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone in the soil in most years. These estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil and thick organic soil material. Table 17 indicates the depth to the seasonally high water table; the kind of water table—apparent or perched; and the months of the year that the water table commonly is high (Jan.-Dec. indicates a high water table year round). A water table that is high for less than one month per year is not indicated in Table 17.

Only saturated zones within a depth of 5 feet are indicated. Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil and a ponded condition is expected. The first numeral in the range indicates how high the water table rises above the surface. The second numeral indicates the depth below the surface that the water table is expected to range.

An *apparent* water table is indicated by the level at which water stands in a freshly dug, unlined borehole after adequate time for adjustments in the surrounding soil. A *perched* water table is one that is above an unsaturated zone in the soil. The basis for determining that a water table is perched may be general knowledge of the area. The water table is proven to be perched if the water level in a borehole is observed to fall when the borehole is extended.

Part 4—References and Glossary

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GLOSSARY

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep rocky slopes.

Acidification. The process in which excess basic metal cations are removed from the soil profile by leaching or plant use. Acidification is normally accompanied by a lowering in soil reaction (pH).

Active layer. The top layer of ground subject to annual thawing and freezing in areas underlain by permafrost.

Aerobic. A condition in which molecular oxygen is present in the soils.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkalinization. The accumulation of basic soil metals such as calcium, magnesium, potassium, and sodium in soil layers. Common products of alkalinization include the accumulation of calcareous calcium and magnesium carbonate compounds.

Alluvial fan. A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates down- slope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and areal extent from mountains to gullied terrains on hill slopes.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpine. Land and related resources occurring above the upper elevational limit of trees (treeline).

Anaerobic. A condition in which molecular oxygen is absent from the soil.

Aspect. 1) The direction in which a slope faces. 2) The general physical appearance of a vegetation cover type.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity in a 60-inch profile or to a limiting layer is expressed as:

Very low……………..	0 to 3 inches
Low…………………..	3 to 6 inches
Moderate…………….	6 to 9 inches
High………………….	9 to 12 inches
Very high…………….	More than 12 inches

Basal area. For trees, the area of the cross section of a single tree or of all trees in a stand, usually measured at breast height (see breast height), expressed in ft^2/acre or m^2/ha. For herbs and shrubs, the area or proportion of the ground surface covered by the stem or stems of plants at about ground level, expressed in ft^2/acre, m^2/acre, or percent.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bog. A peat-forming ecosystem influenced solely by water, which falls directly on to it as rain or snow. Bog vegetation is predominately herbs, shrubs, and stunted trees. *Sphagnum* spp. usually dominates the moss layer.

Breast height. A standard height for measurement of tree diameter and age; 4.5 feet (1.37 m) above the average ground level.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Canopy. The cover of leaves and branches formed by the tops or crowns of plants as viewed from above.

Canopy cover. The proportion of the ground area covered by the vertical projections of the canopy, express as a percent.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clayey soil. Silty clay, sandy clay, or clay.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 cm) in diameter.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

Colluvial processes. Processes associated with transportation and/or deposition by mass movement (direct gravitational action) and local, unconcentrated runoff on sideslopes and/or at the base of slopes.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose—Noncoherent when dry or moist; does not hold together in a mass.

Friable—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic—Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky—Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft—When dry, breaks into powder or individual grains under very slight pressure.

Cemented—hard; little affected by moistening

Cover type. A unit of vegetation essentially similar in composition and development throughout its extent. Synonyms: community type, vegetation type.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cryoturbation (frost churning). The churning of soil materials by frost action, resulting in disrupted or broken horizons, incorporation of material from other horizons, organic

matter accumulation on the permafrost table, and oriented rock fragments.

Deep soil. A soil that is 40 to 60 inches (102 to 152 cm) deep over bedrock or to other material that restricts the penetration of plant roots.

Depth, soil. Generally, the thickness of soil over bedrock. Very deep soils are more than 60 inches (more than 152 cm) deep over bedrock; deep soils, 40 to 60 inches (102 to 152 cm); moderately deep, 20 to 40 inches (51 to 102 cm); shallow, 10 to 20 inches (25 to 51 cm); and very shallow, less than 10 inches (less than 25 cm).

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diffusion. Movement from a zone of high concentration to one of lower concentration.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Effervescence. A bubbling reaction upon addition of dilute hydrochloric acid.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Ericaceous. Refers primarily to the Heath family, Ericaceae—for example, Labrador-tea (*Ledum* spp.), but usually includes the Crowberry family, Empetraceae.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic

agents and by such processes as gravitational creep.

Erosion (geologic)—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains—synonym: natural erosion.

Erosion (accelerated)—Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature—for example, fire that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. The term is more often applied to cliffs resulting from differential erosion.

Esker. A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels of a retreating glacier, and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles (more than 160 km) in length and from 10 to 100 feet (3 to 30 m) in height.

Evapotranspiration. The combined loss of water from a given area and during a specific period of time by evaporation from the soil surface and by transpiration from plants

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Fine textured soil. Sandy clay, silty clay, or clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform built of sediment deposited during overflow and lateral migration of the stream.

Flood plain splay. A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee and deposits its material on the flood plain or fan.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Footslope. The geomorphic component that forms the inner, gently inclined surface at the base of a hill slope. The surface profile is dominantly concave. In terms of gradational processes, a footslope is a transition zone between an upslope site of erosion (backslope) and a downslope site of deposition (toeslope).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A unit of forest vegetation essentially similar in composition and development throughout its extent.

Frost boil. A small mound of fresh soil material formed by frost action. A type of nonsorted circle commonly found in fine-grained sediment underlain by permafrost.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Geomorphic processes. Natural processes that form the landscape and surficial sediments i.e. colluvial processes, deposition, and erosion.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciated uplands. Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted

and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 cm) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 cm) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Herb. Grasses, sedges, forbs, and any other non-woody herbaceous plants.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet (305 m) above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 8 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons of mineral soil are as follows:

O horizon—An organic layer of fresh and decaying plant residue.

A horizon—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

E horizon—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

C horizon—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the number 2 precedes the letter C.

Cr horizon—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

R layer—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Hummock. A rounded or conical mound or other small elevation. Also, a slight rise of ground above a level surface.

Humus. The well decomposed, more or less stable, part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not

considered but are separate factors in predicting runoff. Soils are assigned to four groups. Group A soils have a high infiltration rate when thoroughly wet and have a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. Group D soils, at the other extreme, have a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Hydromorphism. The chemical reduction of soil minerals and the accumulation of organic materials. This process is normally associated with saturated conditions. Evidence of this process includes the presence of abundant redoximorphic features and/or the accumulation of a thick surface organic mat.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for a designed purpose is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Very low……………………	Less than 0.2
Low…………………………	0.2 to 0.4
Moderately low…………….	0.4 to 0.75
Moderate…………………..	0.75 to 1.25
Moderately high…………..	1.25 to 1.75
High………………………..	1.75 to 2.5
Very high…………………..	More than 2.5

Interstitial (ice cyrstals). Ice formation in voids between soil particles.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.6 cm) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Microhigh. An area that is 2 to 12 inches (5 to 30 cm) higher than the adjacent microlow.

Microlow. An area that is 2 to 12 inches (5 to 30 cm) lower than the adjacent microhigh.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minor components. A component of limited extent that may not be present.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately deep soil. A soil that is 20 to 40 inches (51 to 102 cm) deep over bedrock or to other material that restricts the penetration of plant roots.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (more than 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet (more than 305 m) above surrounding lowlands, commonly of limited summit area and generally having steep sides (slopes greater than 25 percent) and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are primarily formed by deep-seated earth movements or volcanic action and secondarily by differential erosion.

Muck. Dark, finely divided, well decomposed organic soil material. (See sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil; and carbon, hydrogen, and oxygen obtained from the air and water.

Observed rooting depth. Depth to which roots have been observed to penetrate.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. An extensive area of glaciofluvial material that was deposited by meltwater streams.

Overstory. The trees in a forest that form the upper canopy layer or layers.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Oxidation. Combination with oxygen; addition of oxygen or other atom or group; removal of hydrogen or other atom or group.

Palsa. (plural palsen) An elliptical dome-like permafrost mound containing alternating layers of ice lenses and peat or mineral soil, commonly 10 to 34 feet (3 to 10 m) high and 7 to 82 feet (2 to 25 m) long, occurring in subarctic bogs and often surrounded by water.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See fibric soil material.)

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Permafrost. Ground, soil, or rock that remains at or below 0°C for at least two years. It is defined on the basis of temperature and is not necessarily frozen.

Permafrost free soil. Permafrost is absent in the upper 60 inches (152 cm) of soil.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow……………. Less than 0.06 inch (0.2 cm)
Slow…………………. 0.06 to 0.2 inch (0.2 to 0.5 cm)
Moderately slow…….. 0.2 to 0.6 inch (0.5 to 1.5 cm)

Moderate…………….	0.6 inch to 2.0 inches (1.5 to 5.1 cm)
Moderately rapid…….	2.0 to 6.0 inches (5.1 to 15.2 cm)
Rapid………………...	6.0 to 20 inches (15.2 to 51.0 cm)
Very rapid……………	More than 20 inches (51.0 cm)

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See reaction, soil.)

Physiochemical. Related to physical and chemical soil properties.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Only percolation or evapotranspiration can remove the water.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential natural community. The assemblage of plants that most nearly achieves a long-term steady state of productivity, structure, and composition on a site. Synonyms: potential plant community, climax plant community, and plant association.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid………………………...	Below 3.5
Extremely acid…………………..	3.5 to 4.5
Very strongly acid………………	4.6 to 5.0
Strongly acid…………………….	5.1 to 5.5
Moderately acid………………….	5.6 to 6.0
Slightly acid……………………..	6.1 to 6.5
Neutral…………………………...	6.6 to 7.3
Slightly alkaline………………….	7.4 to 7.8
Moderately alkaline……………..	7.9 to 8.4
Strongly alkaline…………………	8.5 to 9.0
Very strongly alkaline…………...	9.1 and higher

Redox concentrations. Bodies of apparent accumulation of iron-manganese oxides.

Redox depletions. Bodies of low chroma (≤) having values of 4 or more where iron-manganese oxides alone have been stripped out or where both iron-manganese oxides and clay have been stripped out.

Redoximorphic features. Patches of contrasting colors and low chroma colors formed by the processes of reduction, translocation, and oxidation of iron and manganese oxides.

Regeneration. The new growth of a natural plant community, developing from seed.

Relief. The elevations or inequalities of a land surface, considered collectively.

Rhizosphere. A thin zone of soil adjacent to a root or pore.

Riparian association. A cover type representing the latest successional stage attainable on a specific hydrologically influenced riparian zone site.

Riparian or Riparian zone. Land in close proximity to a water course, lake, or spring and influenced by surface and ground water during all or part of the year.

Riverine. Associated with a river system; active river channel, and land adjacent to the river that is inundated when stream discharge exceeds channel capacity.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no

vegetation.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shallow soil. A soil that is 10 to 20 inches (25 to 51 cm) deep over bedrock or to other material that restricts the penetration of plant roots.

Shoulder slope. The uppermost inclined surface at the top of a hillside. It is the transition zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet (6 m) in 100 feet (30 m) of horizontal distance. In this survey the following slope classes are recognized:

Nearly level………………….	0 to 2 percent
Gently sloping………………	2 to 4 percent
Moderately sloping…………	4 to 8 percent
Strongly sloping…………….	8 to 15 percent
Moderately steep…………..	15 to 25 percent
Steep………………………..	25 to 45 percent
Very steep…………………..	More than 45 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (less than 7.6 cm) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living

matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil group. A collection of soils that form under the influence of similar soil and geomorphic processes and share similar chemical and physical properties.

Soil process. A physical or chemical change in soil brought about by exterior influences.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand………..	2.0 to 1.0
Coarse sand……………..	1.0 to 0.5
Medium sand……………..	0.5 to 0.25
Fine sand…………………	0.25 to 0.10
Very fine sand……………	0.10 to 0.05
Silt…………………………	0.05 to 0.002
Clay………………………..	Less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 61 cm) in diameter if rounded or 6 to 15 inches (15 to 38 cm) in length if flat.

Strandline. A former shoreline now elevated above the present water level. In the Copper River Basin these are more specifically shorelines of a former proglacial lake.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are: *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any soil horizon (A, E, AB, or EB) below the surface layer.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 cm). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from

and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thermal conductivity. A measure of heat transfer through soil.

Thermokarst. Subsidence of the ground surface due to melting of ice masses.

Till plain. An extensive, nearly level to gently rolling or moderately sloping area that is underlain by or consists of till, and that has a slope of 0 to 8 percent.

Toeslope. The outermost inclined surface at the base of a hill. Toeslopes are commonly gentle and linear in profile.

Tussock. A pedestal or rounded mound or other small elevation consisting of sedge and sedge detritus.

Understory. Any plants in a forest or scrub community that grow below and are partially shaded by the tree or shrub overstory.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Very deep soil. A soil that is more than 60 inches (more than 152 cm) deep over bedrock or to other material that restricts the penetration of plant roots.

Very shallow soil. A soil that is less than 10 inches (less than 25 cm) deep over bedrock or to other material that restricts the penetration of plant roots.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Xeric (xerophytic). A group of plants adapted to surviving periods of prolonged moisture deficiency.

Part 5—Figures, Plates, and Tables

FIGURES

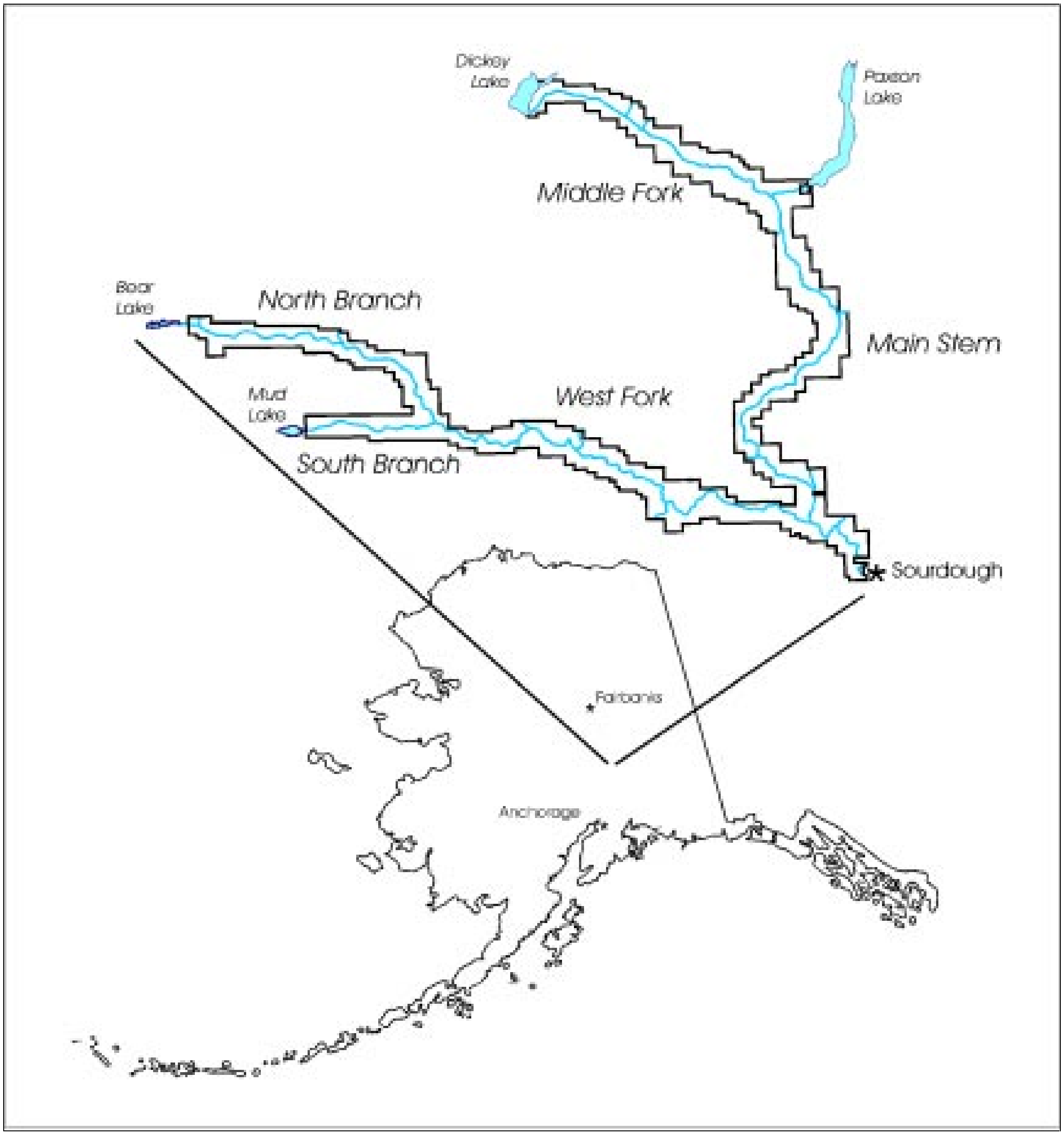


Figure 1. Location of Gulkana River Area, Alaska.

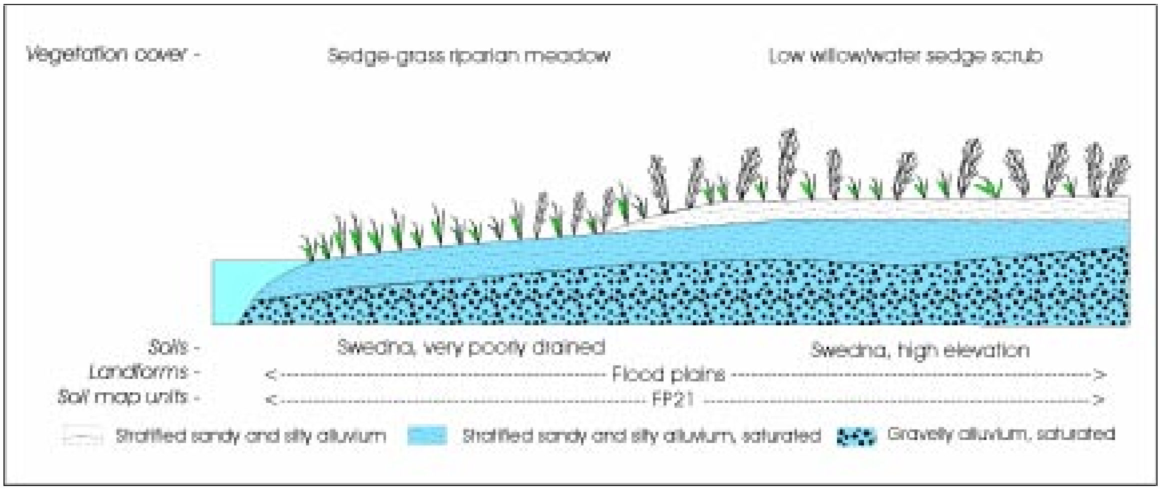


Figure 2. Representative cross section of Landtype Association 135A1.V1 - Loamy and Gravelly Flood Plains along the upper Middle Fork.

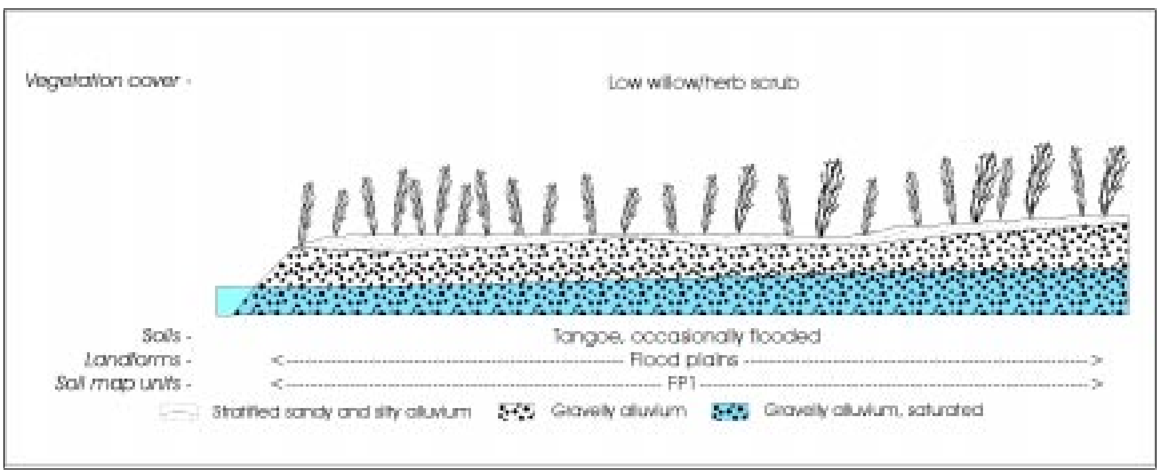


Figure 3. Representative cross section of Landtype Association 135A1.V1 - Loamy and Gravelly Flood Plains along the Main Stem below Paxson Lake.

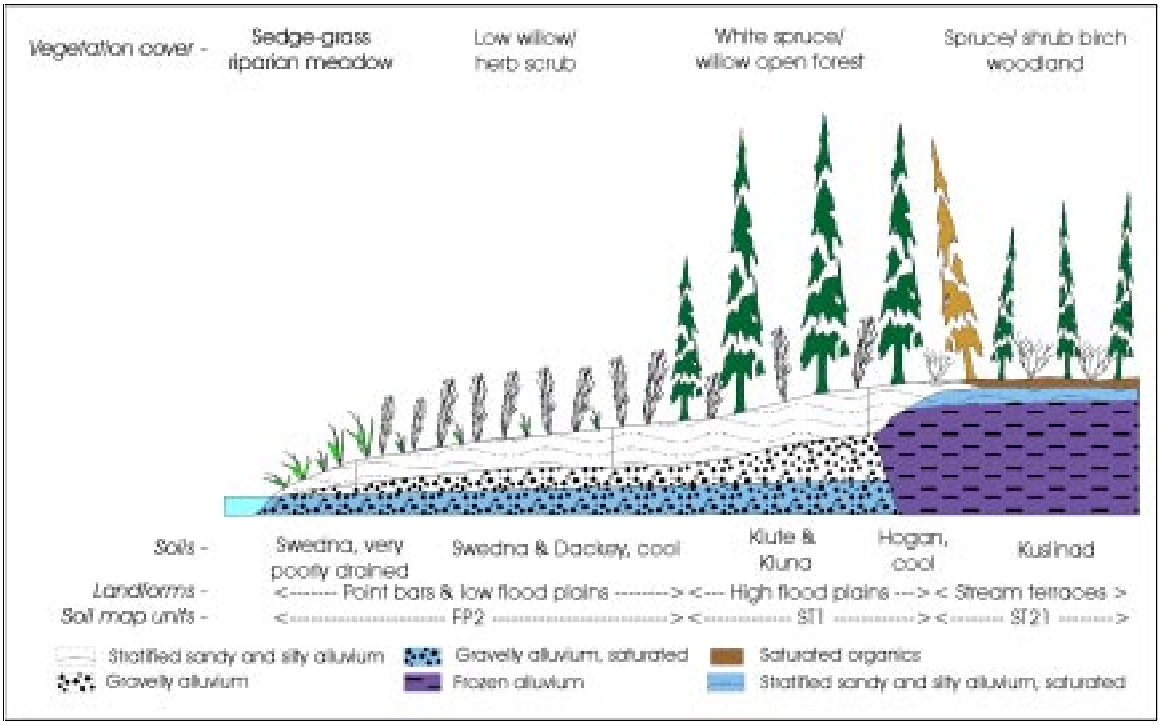


Figure 4. Representative cross section of Landtype Association 135A1.V2 - Northcentral Loamy Flood Plains and Stream Terraces along the upper Main Stem.

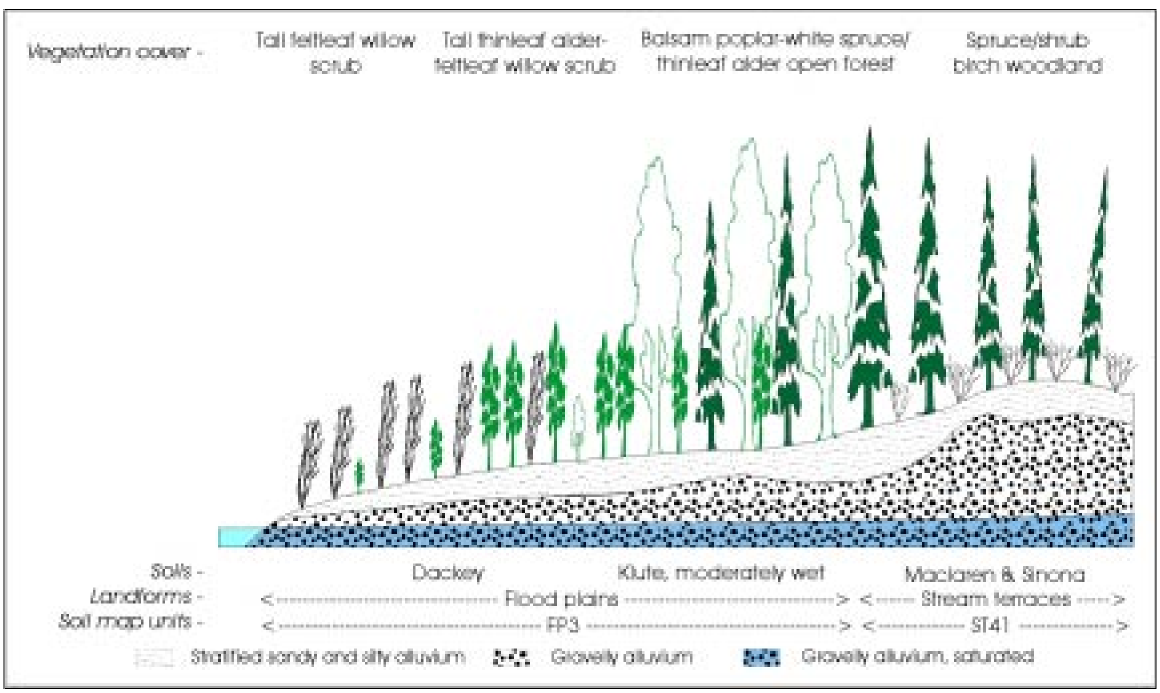


Figure 5. Representative cross section of Landtype Association 135A1.V3 - Southcentral Loamy Flood Plains and Stream Terraces along the Main Stem below Canyon Rapids.

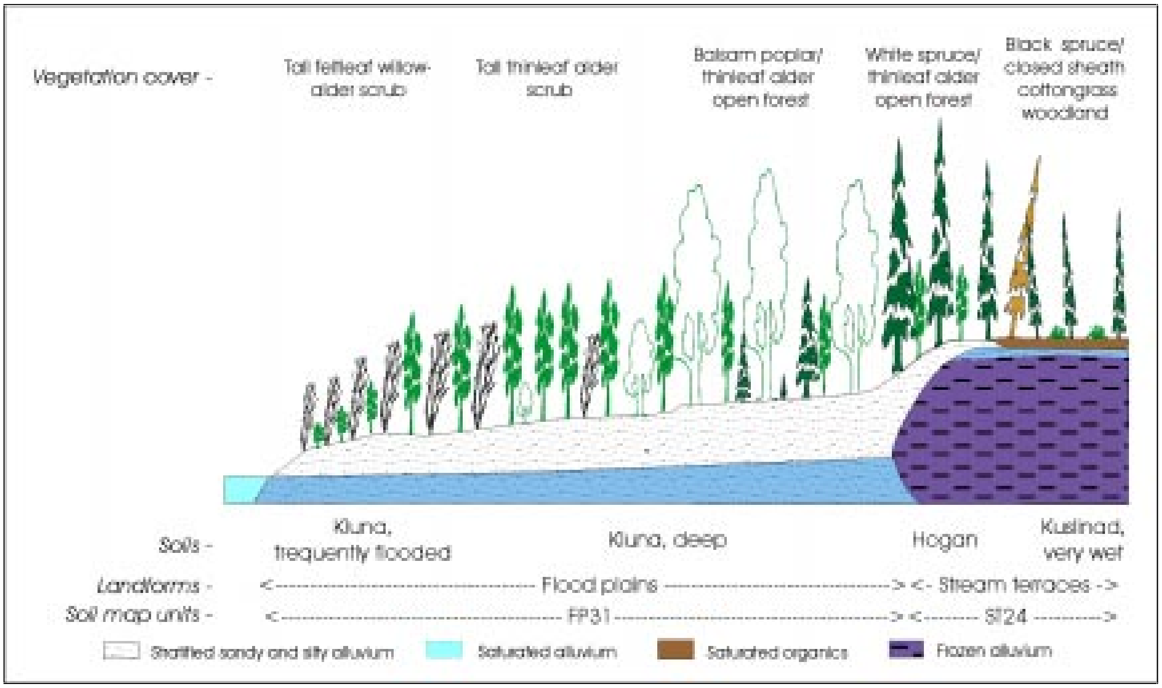


Figure 6. Representative cross section of Landtype Association 135A1.V4 - Southern Loamy Flood Plains and Stream Terraces along the middle West Fork.

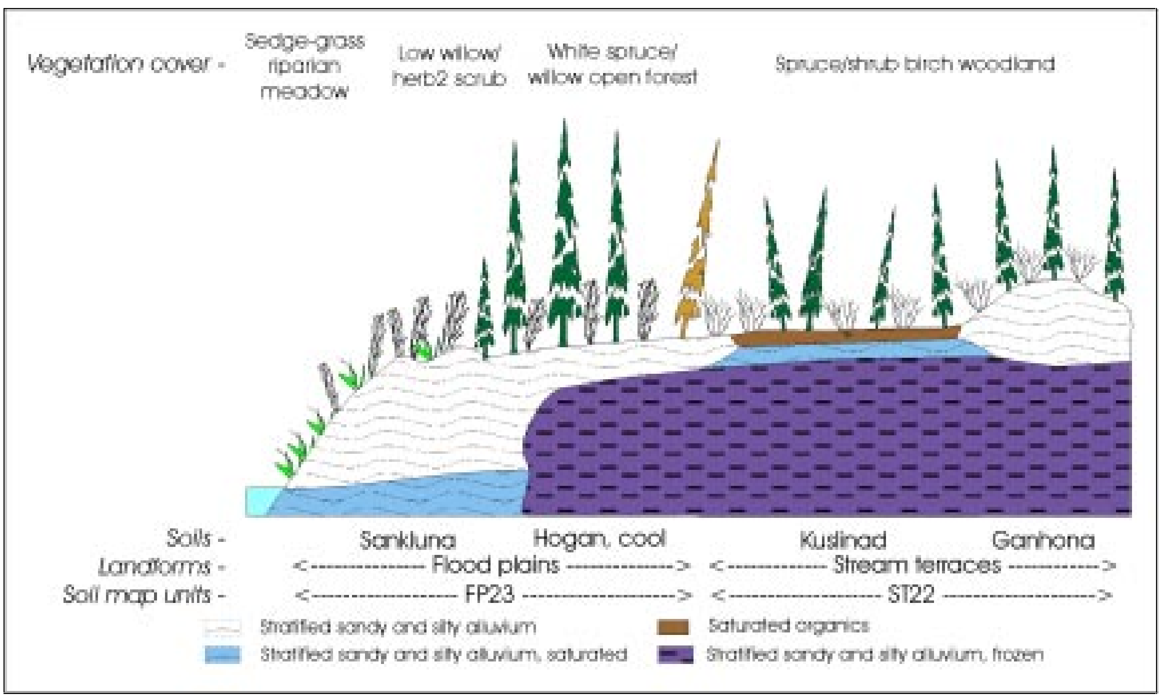


Figure 7. Representative cross section of Landtype Association 135A1.V5 - Lower Middle Fork Flood Plains and Stream Terraces along the lower Middle Fork.

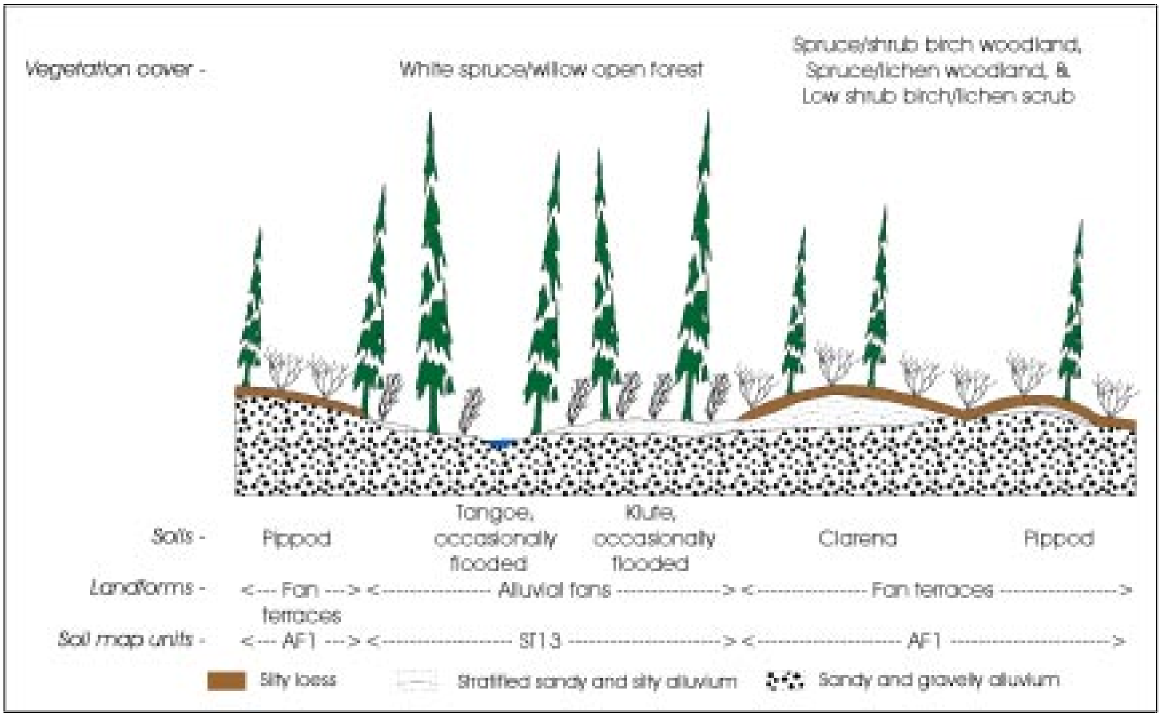


Figure 8. Representative cross section of Landtype Association 135A1.V6 - Gravelly and Loamy Alluvial Fans and Fan Terraces along the upper Middle Fork.

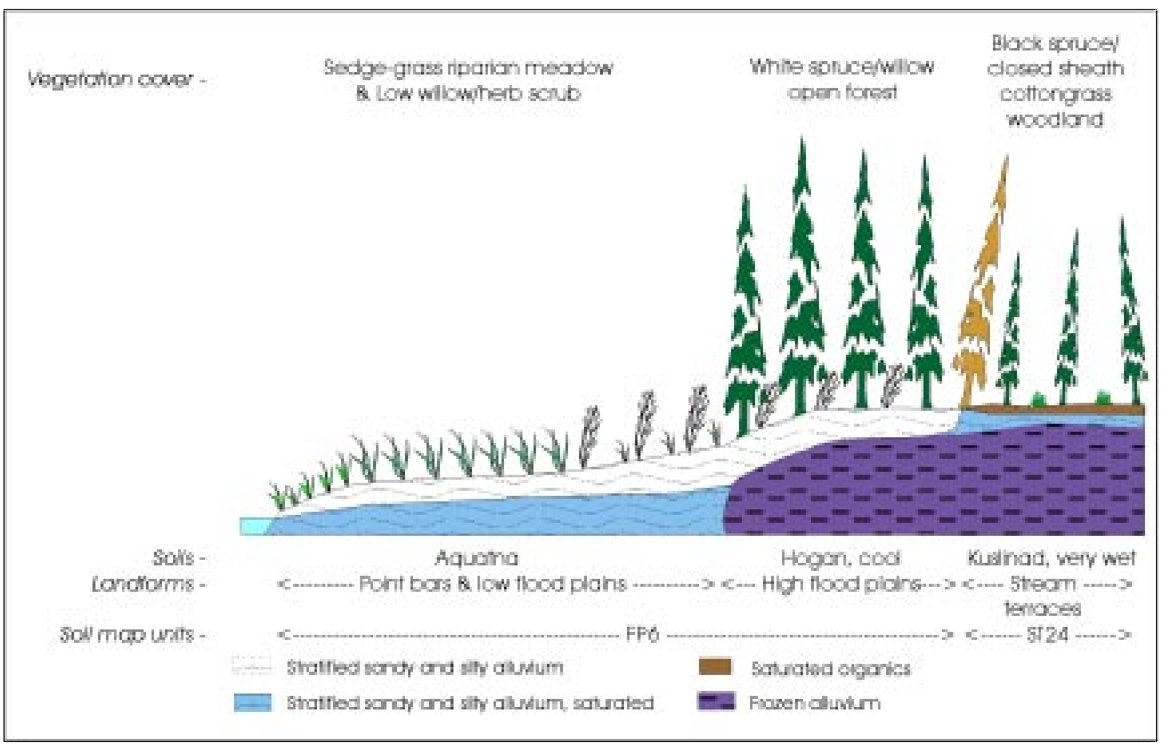


Figure 9. Representative cross section of Landtype Association 135A1.V7 - South Branch Loamy Flood Plains and Stream Terraces along the upper South Branch.

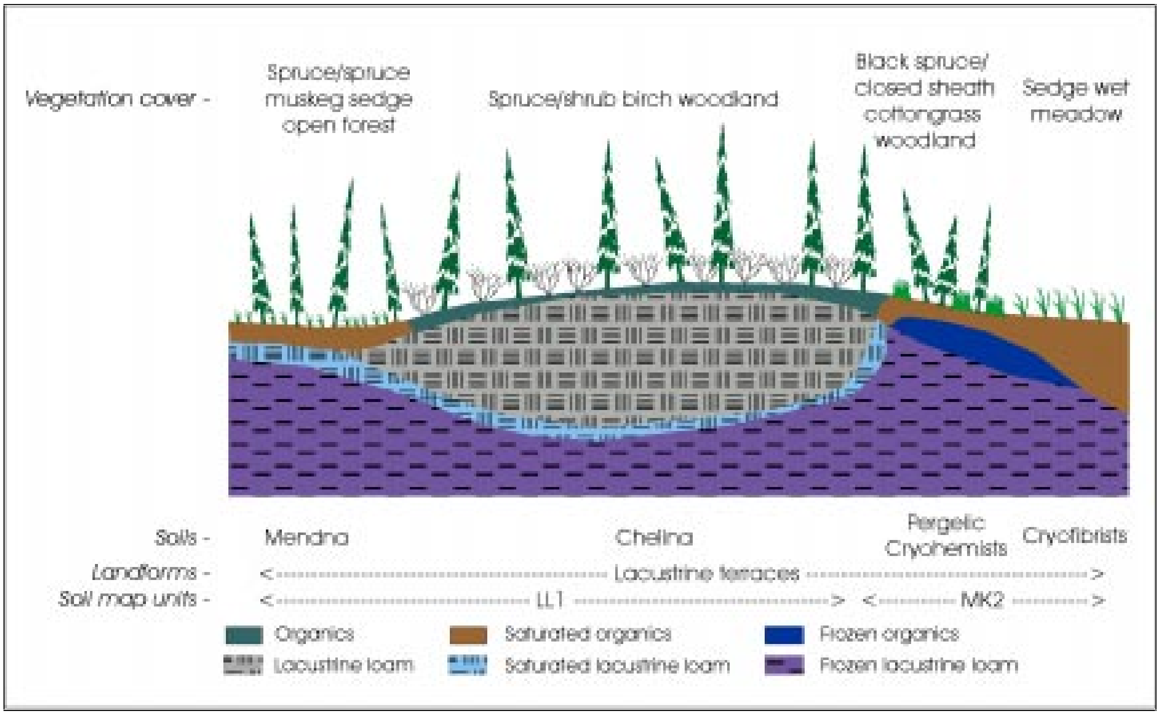


Figure 10. Representative cross section of Landtype Association 135A2.U1 - Loamy Glaciolacustrine Uplands.

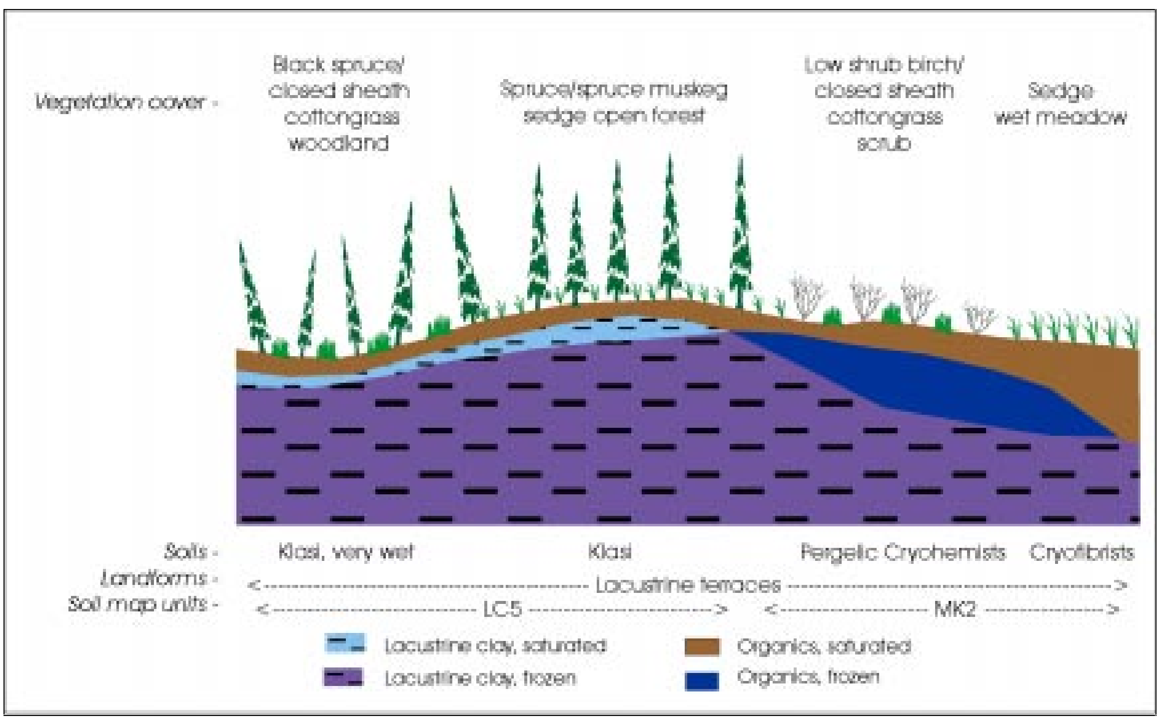


Figure 11. Representative cross section of Landtype Association 135A2.U2 - Clayey Glaciolacustrine Uplands.

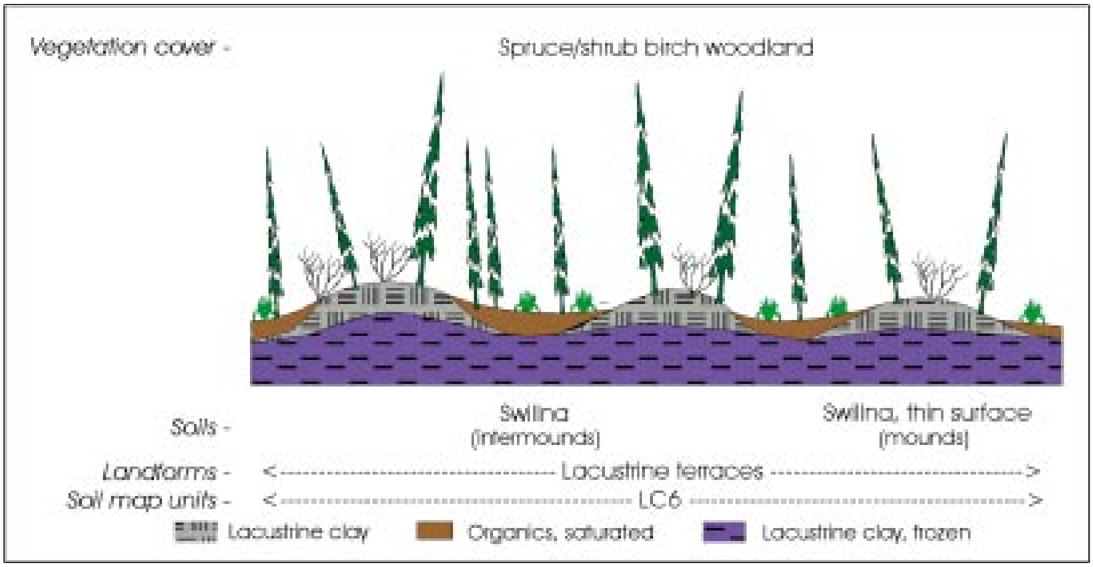


Figure 12. Representative cross section of Landtype Association 135A2.U3 - Ruptic Glaciolacustrine Uplands.

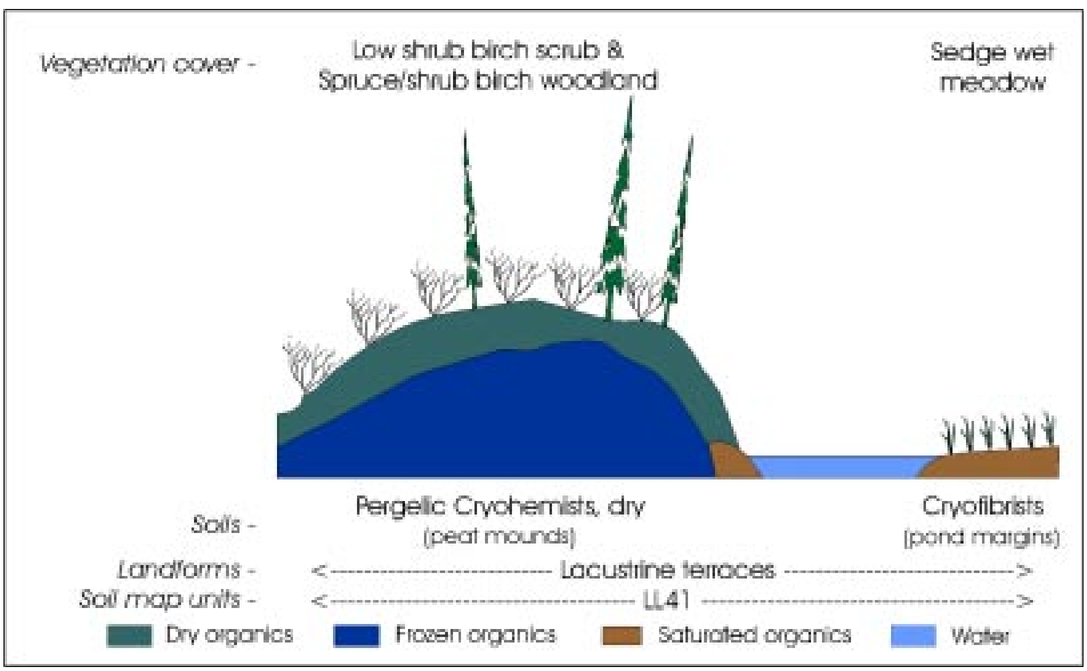


Figure 13. Representative cross section of Landtype Association 135A2.U4 - Loamy, Depressional Glaciolacustrine Uplands.

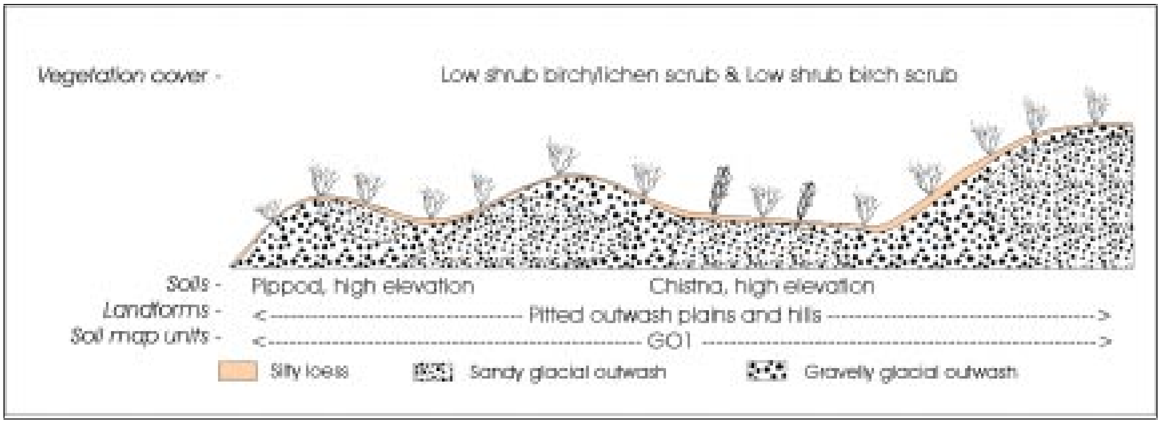


Figure 14. Representative cross section of Landtype Association 135A3.G1 - Gravelly and Sandy Glaciofluvial Uplands.

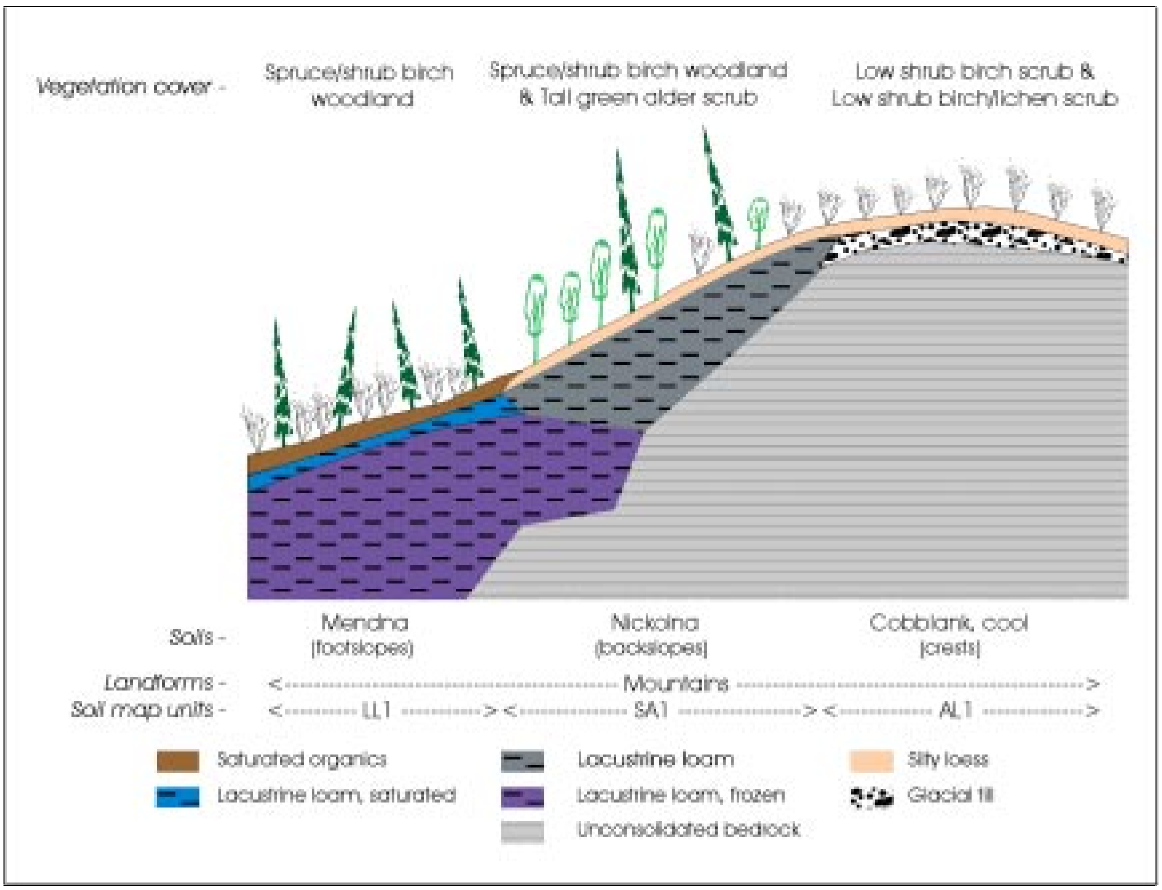


Figure 15. Representative cross section of Landtype Association 135A4.M1 - Northern Low Mountains.

PLATES

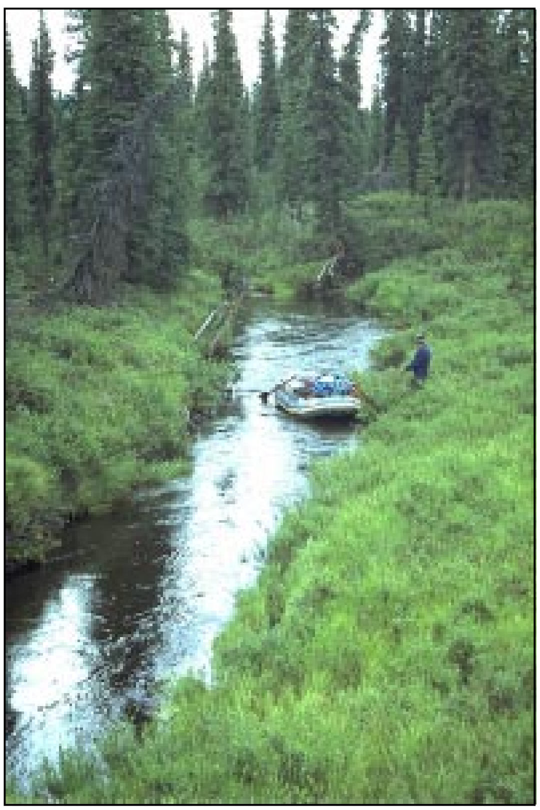
Plate 1. Soils and vegetation on an alluvial fan on the upper Middle Fork.

Upper: The outer portions of the fan support Spruce/lichen woodland and Low shrub birch/lichen scrub on Pippod and Clarena soils. Typical setting of soil map unit AF1—Pippod-Clarena complex, 2 to 10 percent slopes.

Lower: Clarena soil with Low shrub birch/lichen scrub on a fan terrace.

Plate 2. Soils and vegetation on flood plains and stream terraces on the upper North Branch.

Upper: Typical setting of soil map unit FP21—Swedna, high elevation, complex. Adjacent to the channel, Swedna, very poorly drained, soils support Sedge-grass riparian meadow. Swedna, high elevation, soils and Low willow/water sedge scrub are on point bars.



Lower: Typical setting of soil map unit ST441—Kuslinad-Dackey, cool, complex, 0 to 2 percent slopes, along the upper North Branch. Dackey, cool, soils and Low willow/herb scrub are adjacent to the channel. Kuslinad soils on stream terraces support Spruce/shrub birch woodland in most places.

Plate 3. Soils and vegetation on flood plains and stream terraces on the upper Middle Fork.

Upper: Typical setting of soil map unit FP12—Tangoe, wet, complex about one river mile (1.6 km) below Dickey Lake. Tangoe, wet, frequently flooded, soils on low flood plains adjacent to the channel support Sedge-grass riparian meadow and Tall feltleaf willow scrub. Tangoe, wet, occasionally flooded, soils and Low willow/herb scrub interspersed with areas of sparsely vegetated alluvium are on slightly higher flood plains.

Lower: Tangoe, wet, frequently flooded, soils and Low willow/water sedge scrub on a low flood plain. Cobbly alluvium is visible below 8 inches (20 cm) in the soil wedge.

Plate 4. Soils and vegetation on flood plains and stream terraces on the lower Middle Fork.

Upper: Typical setting of soil map units FP23—Hogan, cool-Sankluna complex, 0 to 15 percent slopes, and ST22—Kuslinad-Ganhona complex, 0 to 20 percent slopes. Low willow/herb2 scrub on Sankluna soils and productive White spruce/willow open forest on Hogan soils are on point bars and flood plains in a narrow strip adjacent to the channel. Less productive Spruce/shrub birch woodland on Kuslinad and Ganhona soils is on stream terraces back from the river.

Lower: Low willow/herb2 scrub on Sankluna soils on a high flood plain.

Plate 5. Soils and vegetation on flood plains on the West Fork.

Upper: Klute, moderately wet, soils on a high flood plain. Contact between gravelly substratum and the stratified loamy alluvium is visible at 100 cm (39 inches).

Lower: Typical succession on loamy flood plains. Sparsely vegetated alluvium and young stands of Tall feltleaf willow scrub are found on Dackey soils on low flood plains near the channel. Point bars and higher flood plains support Tall thinleaf alder scrub and Balsam poplar/thinleaf alder open forest on Klute, moderately wet, soils.

Plate 6. Soils and vegetation in the riparian zone on the West Fork.

Upper: Swedna, very poorly drained, soils on a low flood plain adjacent to the channel. Bluish coloration below 50 cm (20 inches) is the result of continuous saturation and hydromorphism.

Lower: Typical setting of Sedge-grass riparian meadow and Swedna, very poorly drained, soils.

Plate 7. Soils and vegetation on glaciolacustrine terraces.

Upper: Typical setting of soil map unit LC6—Swillna, thin surface-Swillna complex, 0 to 15 percent slopes. Swillna, thin surface, soils on the frost boils have sparse ground vegetation and considerable bare soil. Swillna soils in intermound depressions have shallow, ice-rich permafrost and a perched water table.

Lower: Black spruce/closed sheath cottongrass woodland is a common vegetation cover type on glaciolacustrine uplands and older stream terraces.

Plate 8. Soils and vegetation on glaciolacustrine terraces.

Upper: Typical setting of soil map unit LL2—Mendna-Ewan complex, 0 to 6 percent slopes. The vegetation is primarily Spruce/spruce muskeg sedge open forest on Mendna soils, with Low shrub birch-willow/water sedge scrub in drainages and depressions on Ewan soils.

Lower: Klasi soils with a thick organic mat over clayey glaciolacustrine sediments, permafrost, and a perched water table.

Plate 9. Palsa and wet meadow complex on the North Branch.

Upper: Pergelic Cryohemists, dry, soils on a peat mound. The slightly decomposed *Sphagnum*, sedge, and ericaceous shrub peat is frozen at about 100 cm (39 inches). Ice lenses are visible in the lower profile.

Lower: Typical setting of soil map unit LL41—Pergelic Cryohemists, dry-Cryofibrists complex, 0 to 14 percent slopes. The well developed peat mound is elevated about 15 feet (4.6 m) above the adjacent wet meadow-pond complex.

Plate 10. Pond and wet meadow complex on older stream terraces.

Upper: Hufman soils and Sedge wet meadow in a cutoff meander on the Main Stem. Typical setting of soil map unit MK1—Hufman peat.

Lower: Representative areas of soil map units LL411—Pergelic Cryohemists-Mendna, very wet-Cryofibrists complex, 0 to 14 percent slopes and LL41—Pergelic Cryohemists, dry-Cryofibrists complex, 0 to 14 percent slopes on the upper North Branch.

Plate 11. Soils and vegetation on stream terraces on the lower North Branch and West Fork.

Upper: Typical setting of soil map units ST3—Dackey-Hogan complex, 0 to 4 percent slopes and ST21—Kuslinad peat on the North Branch. Dackey soils and Tall thinleaf alder-feltleaf willow scrub are on point bars adjacent to the channel. A narrow zone of Hogan soils and productive White spruce/thinleaf alder open forest quickly gives way to less productive Kuslinad soils and Spruce/shrub birch woodland on the stream terraces.

Lower: Stratified loamy alluvium and organic layers in Hogan soils on a low stream terrace on the West Fork.

Plate 12. Pitted outwash plains and low mountains at higher elevations.

Upper: Typical setting of soil map unit GO1—Pippod and Chistna soils, high elevation, 0 to 30 percent slopes, on pitted outwash plains in the vicinity of Dickey Lake. Sparsely vegetated outwash is found on crests, shoulders, and other convex slopes. Elsewhere, Low shrub birch scrub and Low shrub birch/lichen scrub predominate.

Lower: Low mountains are found along the edge of the Gulkana River area in a few places. Lower slopes are typically mantled in glacial till and lacustrine deposits.

TABLES

Table 1. Temperature and Precipitation for Paxson, Alaska

(For period 1975-1987; Source: *AEIDC 1989*)

Month	Temperature			Precipitation	Snow
	Mean daily maximum	Mean daily minimum	Monthly mean	Mean monthly total	Mean monthly total
	°F	°F	°F	inches	inches
January	10.9	-8.4	1.3	0.92	13.7
February	15.1	-6.5	4.3	0.62	9.5
March	27.6	2.0	14.9	0.84	12.1
April	35.4	11.4	23.5	0.48	7.3
May	50.6	28.1	39.3	0.85	1.2
June	61.5	37.0	49.3	2.91	1.5
July	64.3	42.1	53.2	3.83	0.0
August	60.4	37.5	49.0	3.19	0.0
September	49.5	29.6	39.6	2.76	4.8
October	33.5	16.9	25.2	2.50	19.3
November	17.2	-0.8	8.6	1.07	15.9
December	9.5	-8.3	1.1	1.20	17.0
Yearly mean	36.3	15.1	25.8	--	--
Yearly total	--	--	--	21.17	102.3
Extreme Month/Year	83.0 06/83	-46.0 01/84	--	--	--

Table 2. Temperature and Precipitation for Sourdough, Alaska

(For period 1971-1987; Source: *AEIDC 1989*)

Month	Temperature			Precip-itation	Snow
	Mean daily maximum	Mean daily minimum	Monthly mean	Mean monthly total	Mean monthly total
	°F	°F	°F	inches	inches
January	6.5	-12.0	-2.3	0.65	6.0
February	16.5	-9.6	4.0	0.74	8.2
March	28.3	-2.3	13.0	0.64	5.9
April	39.5	14.1	26.8	0.54	3.6
May	53.4	27.9	40.7	0.66	1.1
June	61.7	36.9	49.3	2.11	0.4
July	66.3	41.9	54.1	3.06	0.0
August	63.1	36.7	49.9	2.11	0.0
September	52.1	28.0	40.1	1.56	1.1
October	34.7	15.2	24.8	1.46	11.1
November	15.4	-4.8	5.3	0.70	7.3
December	4.4	-12.5	-4.0	0.98	9.7
Yearly mean	36.8	13.3	25.1	--	--
Yearly total	--	--	--	15.21	54.4
Extreme Month/Year	90.0 07/72	-62.0 01/73	--	--	--

Table 3. Hierarchy of Ecological Units

(Source for Domain, Division, Province, and Section Levels: *Nowacki and Brock 1995*)

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100 - Polar Domain

130 - Subarctic Division

135 - Alaska Range Taiga Province

135A - Copper River Basin Section

135A1 - Gulkana River Flood Plains and Stream Terraces Subsection

135A1.V1 - Gravelly and Loamy Flood Plains Landtype Association
- 135A1.V1.FP1 - Tangoe sandy loam, frequently flooded
- 135A1.V1.FP12 - Tangoe, wet, complex
- 135A1.V1.FP13 - Swedna, high elevation-Hisna complex, 0 to 6 percent slopes
- 135A1.V1.ST12 - Ogtna mucky fine sandy loam

135A1.V2 - Northcentral Loamy Flood Plains and Stream Terraces Landtype Association
- 135A1.V2.FP2 - Dackey, cool-Swedna-Swedna, very poorly drained, complex, 0 to 8 percent slopes
- 135A1.V2.FP22 - Dackey, cool-Swedna, high elevation-Kluna complex
- 135A1.V2.ST1 - Klute and Kluna soils, 0 to 3 percent slopes
- 135A1.V2.ST2 - Kuslinad-Pergelic Cryohemists, dry-Hufman complex, 0 to 14 percent slopes
- 135A1.V2.ST11 - Klute-Tangoe, occasionally flooded, complex
- 135A1.V2.ST13 - Tangoe, occasionally flooded-Klute, occasionally flooded, complex, 2 to 7 percent slopes
- 135A1.V2.ST21 - Kuslinad peat
- 135A1.V2.ST31 - Dackey, cool-Hogan, cool, complex, 0 to 4 percent slopes
- 135A1.V2.ST441- Kuslinad-Dackey, cool, complex, 0 to 2 percent slopes

135A1.V3 - Southcentral Loamy Flood Plains and Stream Terraces Landtype Association
- 135A1.V3.ST3 - Dackey-Hogan complex, 0 to 4 percent slopes
- 135A1.V3.ST21 - Kuslinad peat
- 135A1.V3.ST41 - Maclaren-Sinona complex, 0 to 15 percent slopes
- 135A1.V3.ST411- Maclaren-Kuslinad complex, 0 to 15 percent slopes

135A1.V4 - Southern Loamy Flood Plains and Stream Terraces Landtype Association
- 135A1.V4.FP3 - Dackey-Klute, moderately wet, complex, occasionally flooded
- 135A1.V4.FP4 - Dackey-Swedna, very poorly drained, complex
- 135A1.V4.FP31 - Kluna, deep-Hogan-Kluna, frequently flooded, complex
- 135A1.V4.FP32 - Dackey-Hogan-Klute, moderately wet, complex
- 135A1.V4.ST2 - Kuslinad-Pergelic Cryohemists, dry-Hufman complex, 0 to 14 percent slopes
- 135A1.V4.ST3 - Dackey-Hogan complex, 0 to 4 percent slopes
- 135A1.V4.ST5 - Haggard peat, 0 to 4 percent slopes
- 135A1.V4.ST21 - Kuslinad peat
- 135A1.V4.ST24 - Kuslinad-Kuslinad, very wet, complex
- 135A1.V4.ST24B- Kuslinad-Kuslinad, very wet-Kusdry complex

135A1.V5 - Lower Middle Fork Flood Plains and Stream Terraces Landtype Association
- 135A1.V5.FP23 - Hogan, cool-Sankluna complex, 0 to 15 percent slopes
- 135A1.V5.MK1 - Hufman peat
- 135A1.V5.ST21 - Kuslinad peat
- 135A1.V5.ST22 - Kuslinad-Ganhona complex, 0 to 20 percent slopes

135A1.V6 - Gravelly and Loamy Alluvial Fans and Fan Terraces Landtype Association
- 135A1.V6.AF1 - Pippod-Clarena complex, 2 to 10 percent slopes
- 135A1.V6.ST13 - Tangoe, occasionally flooded-Klute, occasionally flooded, complex, 2 to 7 percent slopes

135A1.V7 - South Branch Loamy Flood Plains and Stream Terraces Landtype Association
- 135A1.V7.FP6 - Aquatna, frequently flooded-Hogan, cool, complex
- 135A1.V7.ST24 - Kuslinad-Kuslinad, very wet, complex
- 135A1.V7.ST31 - Dackey, cool-Hogan, cool, complex, 0 to 4 percent slopes

135A2 - Glaciolacustrine Terraces and Hills Subsection

135A2.U1 - Loamy Glaciolacustrine Uplands Landtype Association
- 135A2.U1.AT1 - Chistna and Pippod soils, 0 to 14 percent slopes
- 135A2.U1.LL1 - Mendna and Chelina soils, 0 to 10 percent slopes
- 135A2.U1.LL2 - Mendna-Ewan complex, 0 to 6 percent slopes
- 135A2.U1.LL12 - Chelina loam, 0 to 10 percent slopes
- 135A2.U1.MK2 - Pergelic Cryohemists and Cryofibrists soils
- 135A2.U1.TS1 - Cryaquepts, 4 to 25 percent slopes

135A2.U2 - Clayey Glaciolacustrine Uplands Landtype Association
- 135A2.U2.AT1 - Chistna and Pippod soils, 0 to 14 percent slopes
- 135A2.U2.LC1 - Klasi peat, 0 to 10 percent slopes
- 135A2.U2.LC2 - Gadona silty clay, 0 to 10 percent slopes
- 135A2.U2.LC5 - Klasi-Klasi, very wet, complex, 0 to 12 percent slopes
- 135A2.U2.MK2 - Pergelic Cryohemists and Cryofibrists soils
- 135A2.U2.TS14 - Cryaquepts and Cryaquepts, very wet, soils, 4 to 25 percent slopes

135A2.U3 - Ruptic Glaciolacustrine Uplands Landtype Association
- 135A2.U3.LC5 - Klasi-Klasi, very wet, complex, 0 to 12 percent slopes
- 135A2.U3.LC6 - Swillna, thin surface-Swillna complex, 0 to 15 percent slopes
- 135A2.U3.LL41 - Pergelic Cryohemists, dry-Cryofibrists complex, 0 to 14 percent slopes

135A2.U4 - Loamy Depressional Glaciolacustrine Uplands Landtype Association
- 135A2.U4.LL41 - Pergelic Cryohemists, dry-Cryofibrists complex, 0 to 14 percent slopes
- 135A2.U4.LL411- Pergelic Cryohemists-Mendna, very wet-Cryofibrists complex, 0 to 14 percent slopes

135A3 - Glaciofluvial Plains and Hills Subsection

135A3.G1 - Gravelly and Sandy Glaciofluvial Uplands Landtype Association
- 135A3.G1.GO1 - Pippod and Chistna soils, high elevation, 0 to 30 percent slopes

135A4 - Low Mountains Subsection

135A4.M1 - Northern Low Mountains Landtype Association
- 135A4.M1.AL1 - Cobblank, cool-Rock outcrop complex, 0 to 30 percent slopes
- 135A4.M1.AL2 - Cobblank and Telay soils, 2 to 16 percent slopes
- 135A4.M1.BR1 - Cobblank silt loam, 5 to 25 percent slopes
- 135A4.M1.LL1 - Mendna and Chelina soils, 0 to 10 percent slopes
- 135A4.M1.SA1 - Nickolna silt loam, 4 to 16 percent slopes
- 135A4.M1.SA3 - Goodview-Rock outcrop complex, 20 to 50 percent slopes
- 135A4.M1.TS12 - Chelina and Mendna soils, 6 to 20 percent slopes

Table 4. Soil Map Unit Legend and Acreage

Symbol	Soil map unit name	Acres	Ha.	Pct.
AF1	Pippod-Clarena complex, 2 to 10 percent slopes	463	188	0.5
AL1	Cobblank, cool-Rock outcrop complex, 0 to 30 percent slopes	26	11	0.0
AL2	Cobblank and Telay soils, 2 to 16 percent slopes	2116	857	2.3
AT1	Chistna and Pippod soils, 0 to 14 percent slopes	1341	543	1.5
BR1	Cobblank silt loam, 5 to 25 percent slopes	1505	610	1.6
ESC1	Cryorthents and Cryochrepts soils, 20 to 80 percent slopes	4966	2011	5.4
FP1*	Tangoe sandy loam, frequently flooded	203	82	0.2
FP2*	Dackey, cool-Swedna-Swedna, very poorly drained, complex, 0 to 8 percent slopes	119	48	0.1
FP3*	Dackey-Klute, moderately wet, complex, occasionally flooded	728	295	0.8
FP4*	Dackey-Swedna, very poorly drained, complex	15	6	0.0
FP6*	Aquatna, frequently flooded-Hogan, cool, complex	8	3	0.0
FP12	Tangoe, wet, complex	125	51	0.1
FP13*	Swedna, high elevation-Hisna complex, 0 to 6 percent slopes	196	79	0.2
FP21*	Swedna, high elevation, complex	740	300	0.8
FP22*	Dackey, cool-Swedna, high elevation-Kluna complex	166	67	0.2
FP23	Hogan, cool-Sankluna complex, 0 to 15 percent slopes	434	176	0.5
FP31	Kluna, deep-Hogan-Kluna, frequently flooded, complex	493	200	0.5
FP32	Dackey-Hogan-Klute, moderately wet, complex	951	385	1.0
GO1	Pippod and Chistna soils, high elevation, 0 to 30 percent slopes	1460	591	1.6
LC1	Klasi peat, 0 to 10 percent slopes	10296	4170	11.2
LC2	Gadona silty clay, 0 to 10 percent slopes	1070	433	1.2
LC5	Klasi-Klasi, very wet, complex, 0 to 12 percent slopes	1003	406	1.1
LC6	Swillna, thin surface-Swillna complex, 0 to 15 percent slopes	2849	1154	3.1
LL1	Mendna and Chelina soils, 0 to 10 percent slopes	15325	6207	16.7
LL2	Mendna-Ewan complex, 0 to 6 percent slopes	9109	3689	9.9
LL3	Gadona silty clay, 5 to 20 percent slopes	252	102	0.3
LL12	Chelina loam, 0 to 10 percent slopes	2282	924	2.5
LL13	Chelina loam, 7 to 25 percent slopes	687	278	0.7
LL41	Pergelic Cryohemists, dry-Cryofibrists complex, 0 to 14 percent slopes	738	299	0.8
LL411	Pergelic Cryohemists-Mendna, very wet-Cryofibrists complex, 0 to 14 percent slopes	2287	926	2.5
MK1	Hufman peat	683	276	0.7
MK2	Pergelic Cryohemists and Cryofibrists soils	1260	510	1.4
SA1	Nickolna silt loam, 4 to 16 percent slopes	593	240	0.6
SA3	Goodview-Rock outcrop complex, 20 to 50 percent slopes	174	70	0.2
ST1	Klute and Kluna soils, 0 to 3 percent slopes	453	183	0.5
ST2	Kuslinad-Pergelic Cryohemists, dry-Hufman complex, 0 to 14 percent slopes	612	248	0.7
ST3*	Dackey-Hogan complex, 0 to 4 percent slopes	1221	495	1.3
ST4	Hogan fine sandy loam	341	138	0.4
ST5	Haggard peat, 0 to 4 percent slopes	1159	469	1.3

* See footnote at end of table.

Table 4. Soil Map Unit Legend and Acreage (Continued)

Symbol	Soil map unit name	Acres	Ha.	Pct.
ST11	Klute-Tangoe, occasionally flooded, complex	68	27	0.1
ST12	Ogtna mucky fine sandy loam	137	55	0.1
ST13*	Tangoe, occasionally flooded-Klute, occasionally flooded, complex, 2 to 7 percent slopes	336	136	0.4
ST21	Kuslinad peat	2212	896	2.4
ST22	Kuslinad-Ganhona complex, 0 to 20 percent slopes	763	309	0.8
ST24	Kuslinad-Kuslinad, very wet, complex	3274	1326	3.6
ST24B	Kuslinad-Kuslinad, very wet-Kusdry complex	985	399	1.1
ST31*	Dackey, cool-Hogan, cool, complex, 0 to 4 percent slopes	156	63	0.2
ST41	Maclaren-Sinona complex, 0 to 15 percent slopes	642	260	0.7
ST411	Maclaren-Kuslinad complex, 0 to 15 percent slopes	1699	688	1.8
ST441	Kuslinad-Dackey, cool, complex, 0 to 2 percent slopes	424	172	0.5
TS1	Cryaquepts, 4 to 25 percent slopes	3158	1279	3.4
TS3	Mankomen peat, 0 to 15 percent slopes	373	151	0.4
TS12	Chelina and Mendna soils, 6 to 20 percent slopes	3902	1580	4.2
TS14	Cryaquepts and Cryaquepts, very wet, soils, 4 to 25 percent slopes	1527	619	1.7
W	Water	3881	1572	4.2
	Total area	91986	37252	100.0

* These units can occur as narrow riparian strips and are often represented on the soil maps with line symbols, not polygons. Because line symbols where not included in acreage calculations, actual acreage of these units is slightly greater than reported in the table.

Table 5. Common Vegetation Cover Types Found on Soils

Map unit symbol: Map unit component	Common cover types
AF1:	
Pippod	Low shrub birch/lichen scrub Spruce/shrub birch woodland
Clarena	Spruce/lichen woodland Low shrub birch/lichen scrub
AL1:	
Cobblank, cool	Low shrub birch scrub Low shrub birch/lichen scrub
Rock outcrop.	---
AL2:	
Cobblank	Spruce/shrub birch woodland
Telay	Spruce/shrub birch woodland
AT1:	
Chistna	Spruce/shrub birch woodland Spruce/lichen woodland Quaking aspen-white spruce forest
Pippod	Spruce/shrub birch woodland Spruce/lichen woodland Quaking aspen-white spruce forest
BR1:	
Cobblank	Spruce/shrub birch woodland Tall green alder scrub
ESC1:	
Cryorthents	Spruce/shrub birch woodland Quaking aspen-white spruce forest White spruce forest
Cryochrepts	Spruce/shrub birch woodland Quaking aspen-white spruce forest White spruce forest
FP1:	
Tangoe sandy loam, frequently flooded	Low willow/herb scrub White spruce/willow open forest Tall feltleaf willow scrub
FP2:	
Dackey, cool	Low willow/herb scrub White spruce/willow open forest
Swedna	Low willow/herb scrub Tall feltleaf willow scrub
Swedna, very poorly drained	Sedge-grass riparian meadow Low willow/water sedge scrub
FP3:	
Dackey	Tall thinleaf alder-feltleaf willow scrub Balsam poplar/thinleaf alder open forest Tall feltleaf willow/alder scrub
Klute, moderately wet	Balsam poplar-white spruce/thinleaf alder open forest Balsam poplar/thinleaf alder open forest

Table 5. Common Vegetation Cover Types Found on Soils (Continued)

Map unit symbol: Map unit component	Common cover types
FP4:	
Dackey----------------------------	Tall thinleaf alder/willow scrub Tall thinleaf alder scrub
Swedna, very poorly drained------	Sedge-grass riparian meadow
FP6:	
Aquatna, frequently flooded------	Low willow/herb scrub Sedge-grass riparian meadow
Hogan, cool----------------------	White spruce/willow open forest
FP12:	
Tangoe, wet, occasionally flooded	Low willow/herb scrub Tall feltleaf willow scrub Sparsely vegetated alluvium
Tangoe, wet, frequently flooded--	Low willow/herb scrub Tall feltleaf willow scrub Sedge-grass riparian meadow
FP13:	
Swedna, high elevation-----------	Low willow/water sedge scrub Low willow/herb scrub Tall feltleaf willow scrub
Hisna----------------------------	Low willow/water sedge scrub Low willow/herb scrub
FP21:	
Swedna, high elevation-----------	Low willow/water sedge scrub Low willow/herb scrub
Swedna, very poorly drained------	Sedge-grass riparian meadow Low willow/herb scrub
FP22:	
Dackey, cool---------------------	Low willow/herb scrub White spruce/willow open forest Tall feltleaf willow scrub
Swedna, high elevation-----------	Low willow/water sedge scrub Low willow/herb scrub
Kluna----------------------------	White spruce/willow open forest
FP23:	
Hogan, cool----------------------	White spruce/willow open forest
Sankluna-------------------------	Low willow/herb2 scrub
FP31:	
Kluna, deep----------------------	Balsam poplar/thinleaf alder open forest Tall thinleaf alder scrub Balsam poplar-white spruce/thinleaf alder open forest
Hogan----------------------------	White spruce/thinleaf alder open forest White spruce/ericaceous shrub open forest
Kluna, frequently flooded--------	Tall thinleaf alder-feltleaf willow scrub Tall feltleaf willow/alder scrub

Table 5. Common Vegetation Cover Types Found on Soils (Continued)

Map unit symbol: Map unit component	Common cover types
FP32:	
Dackey	Tall thinleaf alder-feltleaf willow scrub Tall thinleaf alder scrub Tall feltleaf willow/alder scrub
Hogan	White spruce/thinleaf alder open forest White spruce/ericaceous shrub open forest
Klute, moderately wet	Balsam poplar/thinleaf alder open forest Balsam poplar-white spruce/thinleaf alder open forest White spruce/thinleaf alder open forest
GO1:	
Pippod, high elevation	Low shrub birch/lichen scrub Low shrub birch scrub
Chistna, high elevation	Low shrub birch/lichen scrub Low shrub birch scrub
LC1:	
Klasi peat	Spruce/spruce muskeg sedge open forest Spruce/shrub birch woodland Black spruce/closed sheath cottongrass woodland
LC2:	
Gadona silty clay	Spruce/shrub birch woodland Spruce/spruce muskeg sedge open forest Low shrub birch scrub
LC5:	
Klasi	Spruce/spruce muskeg sedge open forest Spruce/shrub birch woodland
Klasi, very wet	Black spruce/closed sheath cottongrass woodland
LC6:	
Swillna, thin surface	Spruce/shrub birch woodland Spruce/lichen woodland Black spruce/closed sheath cottongrass woodland
Swillna	Black spruce/closed sheath cottongrass woodland Spruce/shrub birch woodland
LL1:	
Mendna	Spruce/spruce muskeg sedge open forest Spruce/shrub birch woodland
Chelina	Spruce/shrub birch woodland Low shrub birch scrub Spruce/spruce muskeg sedge open forest
LL2:	
Mendna	Spruce/shrub birch woodland Spruce/spruce muskeg sedge open forest Low shrub birch scrub
Ewan	Low shrub birch-willow/water sedge scrub Spruce/water sedge woodland Spruce/willow woodland

Table 5. Common Vegetation Cover Types Found on Soils (Continued)

Map unit symbol: Map unit component	Common cover types
LL3:	
Gadona silty clay	Spruce/shrub birch woodland Spruce/lichen woodland
LL12:	
Chelina loam	Spruce/shrub birch woodland
LL13:	
Chelina loam	Spruce/shrub birch woodland Low shrub birch scrub
LL41:	
Pergelic Cryohemists, dry	Black spruce/shrub birch woodland Low shrub birch scrub
Cryofibrists	Sedge wet meadow
LL411:	
Pergelic Cryohemists	Black spruce/closed sheath cottongrass woodland Spruce/spruce muskeg sedge open forest
Mendna, very wet	Spruce/spruce muskeg sedge open forest Low shrub birch scrub Black spruce/closed sheath cottongrass woodland
Cryofibrists	Sedge wet meadow Low shrub birch-willow/water sedge scrub
MK1:	
Hufman peat	Sedge wet meadow Low shrub birch-willow/water sedge scrub
MK2:	
Pergelic Cryohemists	Black spruce/closed sheath cottongrass woodland Low shrub birch/closed sheath cottongrass scrub Spruce/spruce muskeg sedge open forest
Cryofibrists	Sedge wet meadow Low shrub birch-willow/water sedge scrub
SA1:	
Nickolna silt loam	Spruce/shrub birch woodland Spruce/willow woodland Tall green alder scrub
SA3:	
Goodview	Low shrub birch/lichen scrub Low shrub birch scrub
Rock outcrop.	---
ST1:	
Klute	White spruce/willow open forest Low willow/herb scrub Spruce/shrub birch woodland
Kluna	White spruce/willow open forest Spruce/shrub birch woodland
ST2:	
Kuslinad	Spruce/shrub birch woodland

Table 5. Common Vegetation Cover Types Found on Soils (Continued)

Map unit symbol: Map unit component	Common cover types
ST2: (cont'd)	
Pergelic Cryohemists, dry	Low shrub birch scrub Spruce/shrub birch woodland
Hufman	Sedge wet meadow
ST3:	
Dackey	Tall thinleaf alder/willow scrub Tall thinleaf alder scrub Balsam poplar/thinleaf alder open forest
Hogan	White spruce/ericaceous shrub open forest White spruce/thinleaf alder open forest
ST4:	
Hogan fine sandy loam	White spruce/thinleaf alder open forest White spruce/ericaceous shrub open forest
ST5:	
Haggard peat	Black spruce/closed sheath cottongrass woodland Low shrub birch/closed sheath cottongrass scrub
ST11:	
Klute	White spruce/willow open forest
Tangoe, occasionally flooded	White spruce/willow open forest
ST12:	
Ogtna mucky fine sandy loam	Low willow/herb scrub Low shrub birch scrub
ST13:	
Tangoe, occasionally flooded	White spruce/willow open forest
Klute, occasionally flooded	White spruce/willow open forest
ST21:	
Kuslinad peat	Spruce/shrub birch woodland Spruce/spruce muskeg sedge open forest
ST22:	
Kuslinad	Spruce/shrub birch woodland Spruce/spruce muskeg sedge open forest
Ganhona	Spruce/shrub birch woodland Spruce/lichen woodland
ST24:	
Kuslinad	Spruce/shrub birch woodland Spruce/spruce muskeg sedge open forest Low shrub birch scrub
Kuslinad, very wet	Black spruce/closed sheath cottongrass woodland Low shrub birch/closed sheath cottongrass scrub
ST24B:	
Kuslinad	Spruce/shrub birch woodland Spruce/spruce muskeg sedge open forest
Kuslinad, very wet	Black spruce/closed sheath cottongrass woodland Low shrub birch/closed sheath cottongrass scrub

Table 5. Common Vegetation Cover Types Found on Soils (Continued)

Map unit symbol: Map unit component	Common cover types
ST24B: (cont'd)	
Kusdry----------------------------	Spruce/shrub birch woodland Spruce/spruce muskeg sedge open forest Black spruce/closed sheath cottongrass woodland
ST31:	
Dackey, cool----------------------	Tall feltleaf willow scrub Low willow/herb scrub
Hogan, cool-----------------------	White spruce/willow open forest
ST41:	
Maclaren--------------------------	Spruce/shrub birch woodland
Sinona----------------------------	Spruce/shrub birch woodland
ST411:	
Maclaren--------------------------	Spruce/lichen woodland Spruce/shrub birch woodland
Kuslinad, very wet----------------	Black spruce/closed sheath cottongrass woodland
Kuslinad--------------------------	Spruce/shrub birch woodland Spruce/spruce muskeg sedge open forest Spruce/lichen woodland
ST441:	
Kuslinad--------------------------	Spruce/shrub birch woodland Spruce/spruce muskeg sedge open forest Low shrub birch scrub
Dackey, cool----------------------	Low willow/herb scrub
TS1:	
Cryaquepts------------------------	Spruce/spruce muskeg sedge open forest Spruce/shrub birch woodland Spruce/willow woodland
TS3:	
Mankomen peat---------------------	Spruce/spruce muskeg sedge open forest
TS12:	
Chelina---------------------------	Spruce/shrub birch woodland Low shrub birch scrub Spruce/spruce muskeg sedge open forest
Mendna----------------------------	Spruce/spruce muskeg sedge open forest Spruce/shrub birch woodland
TS14:	
Cryaquepts------------------------	Spruce/spruce muskeg sedge open forest Spruce/shrub birch woodland
Cryaquepts, very wet--------------	Black spruce/closed sheath cottongrass woodland Spruce/spruce muskeg sedge open forest
W:	
Water-----------------------------	Aquatic herbaceous

Table 6. Ecological Sites Correlated to Soils

Map unit symbol: Map unit component	Site name (Potential natural plant community)
AF1:	
Pippod----------------------------	Gravelly and sandy terraces (Spruce/lichen woodland)
Clarena---------------------------	Gravelly and sandy terraces (Spruce/lichen woodland)
AL1:	
Cobblank, cool--------------------	Upper mountain slopes, shallow (Low shrub birch scrub)
Rock outcrop.	
AL2:	
Cobblank--------------------------	Mountain slopes, shallow (Spruce/shrub birch woodland)
Telay-----------------------------	Glaciolacustrine uplands (Spruce/shrub birch woodland)
AT1:	
Chistna---------------------------	Gravelly and sandy terraces (Spruce/lichen woodland)
Pippod----------------------------	Gravelly and sandy terraces (Spruce/lichen woodland)
BR1:	
Cobblank--------------------------	Mountain slopes, shallow (Spruce/shrub birch woodland)
ESC1:	
Cryorthents-----------------------	Escarpments
Cryochrepts-----------------------	Escarpments
FP1:	
Tangoe sandy loam, frequently flooded	Gravelly flood plains, moderately wet (Low willow/herb scrub)
FP2:	
Dackey, cool----------------------	Loamy flood plains, moderately wet (Low willow/herb scrub)
Swedna----------------------------	Loamy flood plains, moderately wet (Low willow/herb scrub)
Swedna, very poorly drained------	Loamy riverbanks (Sedge-grass riparian meadow)
FP3:	
Dackey----------------------------	Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)
Klute, moderately wet------------	Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)
FP4:	
Dackey----------------------------	Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)
Swedna, very poorly drained------	Loamy riverbanks (Sedge-grass riparian meadow)
FP6:	
Aquatna, frequently flooded------	Loamy riverbanks (Sedge-grass riparian meadow)
Hogan, cool-----------------------	Loamy high flood plains (White spruce/willow open forest)
FP12:	
Tangoe, wet, occasionally flooded	Gravelly flood plains, moderately wet (Low willow/herb scrub)
Tangoe, wet, frequently flooded--	Loamy flood plains, wet (Low willow/water sedge scrub)
FP13:	
Swedna, high elevation-----------	Loamy flood plains, wet (Low willow/water sedge scrub)
Hisna-----------------------------	Loamy flood plains, wet (Low willow/water sedge scrub)

Table 6. Ecological Sites Correlated to Soils (Continued)

Map unit symbol: Map unit component	Site name (Potential natural plant community)
FP21:	
Swedna, high elevation-----------	Loamy flood plains, wet (Low willow/water sedge scrub)
Swedna, very poorly drained------	Loamy riverbanks (Sedge-grass riparian meadow)
FP22:	
Dackey, cool---------------------	Loamy flood plains, moderately wet (Low willow/herb scrub)
Swedna, high elevation-----------	Loamy flood plains, wet (Low willow/water sedge scrub)
Kluna----------------------------	Loamy high flood plains (White spruce/willow open forest)
FP23:	
Hogan, cool----------------------	Loamy high flood plains (White spruce/willow open forest)
Sankluna-------------------------	Loamy flood plains, moderately wet (Low willow/herb scrub)
FP31:	
Kluna, deep----------------------	Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)
Hogan----------------------------	Loamy high flood plains, frozen (White spruce/thinleaf alder open forest)
Kluna, frequently flooded--------	Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)
FP32:	
Dackey---------------------------	Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)
Hogan----------------------------	Loamy high flood plains, frozen (White spruce/thinleaf alder open forest)
Klute, moderately wet------------	Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)
GO1:	
Pippod, high elevation-----------	Gravelly and sandy hills (Low shrub birch/lichen scrub)
Chistna, high elevation----------	Gravelly and sandy hills (Low shrub birch/lichen scrub)
LC1:	
Klasi peat-----------------------	Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)
LC2:	
Gadona silty clay----------------	Glaciolacustrine uplands (Spruce/shrub birch woodland)
LC5:	
Klasi----------------------------	Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)
Klasi, very wet------------------	Terraces, wet (Black spruce/closed sheath cottongrass woodland)
LC6:	
Swillna, thin surface------------	Glaciolacustrine uplands, ruptic (Spruce/shrub birch woodland)
Swillna--------------------------	Glaciolacustrine uplands, ruptic (Spruce/shrub birch woodland)
LL1:	
Mendna---------------------------	Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)
Chelina--------------------------	Glaciolacustrine uplands (Spruce/shrub birch woodland)
LL2:	
Mendna---------------------------	Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)
Ewan-----------------------------	Shallow drainages (Low shrub birch-willow/water sedge scrub)

Table 6. Ecological Sites Correlated to Soils (Continued)

Map unit symbol: Map unit component	Site name (Potential natural plant community)
LL3:	
Gadona silty clay	Glaciolacustrine uplands (Spruce/shrub birch woodland)
LL12:	
Chelina loam	Glaciolacustrine uplands (Spruce/shrub birch woodland)
LL13:	
Chelina loam	Glaciolacustrine uplands (Spruce/shrub birch woodland)
LL41:	
Pergelic Cryohemists, dry	Peat mounds (Spruce/shrub birch woodland)
Cryofibrists	Wet depressions (Sedge wet meadow)
LL411:	
Pergelic Cryohemists	Terraces, wet (Black spruce/closed sheath cottongrass woodland)
Mendna, very wet	Terraces, wet (Black spruce/closed sheath cottongrass woodland)
Cryofibrists	Wet depressions (Sedge wet meadow)
MK1:	
Hufman peat	Wet depressions (Sedge wet meadow)
MK2:	
Pergelic Cryohemists	Terraces, wet (Black spruce/closed sheath cottongrass woodland)
Cryofibrists	Wet depressions (Sedge wet meadow)
SA1:	
Nickolna silt loam	Loamy backslopes
SA3:	
Goodview	Upper mountain slopes, shallow (Low shrub birch scrub)
Rock outcrop.	
ST1:	
Klute	Loamy high flood plains (White spruce/willow open forest)
Kluna	Loamy high flood plains (White spruce/willow open forest)
ST2:	
Kuslinad	Stream terraces, frozen (Spruce/spruce muskeg sedge open forest)
Pergelic Cryohemists, dry	Peat mounds (Spruce/shrub birch woodland)
Hufman	Wet depressions (Sedge wet meadow)
ST3:	
Dackey	Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)
Hogan	Loamy high flood plains, frozen (White spruce/thinleaf alder open forest)
ST4:	
Hogan fine sandy loam	Loamy high flood plains, frozen (White spruce/thinleaf alder open forest)
ST5:	
Haggard peat	Terraces, wet (Black spruce/closed sheath cottongrass woodland)

Table 6. Ecological Sites Correlated to Soils (Continued)

Map unit symbol: Map unit component	Site name (Potential natural plant community)
ST11:	
Klute----------------------------	Loamy high flood plains (White spruce/willow open forest)
Tangoe, occasionally flooded-----	Loamy high flood plains (White spruce/willow open forest)
ST12:	
Ogtna mucky fine sandy loam------	Loamy flood plains, moderately wet (Low willow/herb scrub)
ST13:	
Tangoe, occasionally flooded-----	Loamy high flood plains (White spruce/willow open forest)
Klute, occasionally flooded------	Loamy high flood plains (White spruce/willow open forest)
ST21:	
Kuslinad peat--------------------	Stream terraces, frozen (Spruce/spruce muskeg sedge open forest)
ST22:	
Kuslinad-------------------------	Stream terraces, frozen (Spruce/spruce muskeg sedge open forest)
Ganhona--------------------------	Stream terraces (Spruce/shrub birch woodland)
ST24:	
Kuslinad-------------------------	Stream terraces, frozen (Spruce/spruce muskeg sedge open forest)
Kuslinad, very wet---------------	Terraces, wet (Black spruce/closed sheath cottongrass woodland)
ST24B:	
Kuslinad-------------------------	Stream terraces, frozen (Spruce/spruce muskeg sedge open forest)
Kuslinad, very wet---------------	Terraces, wet (Black spruce/closed sheath cottongrass woodland)
Kusdry---------------------------	Stream terraces (Spruce/shrub birch woodland)
ST31:	
Dackey, cool---------------------	Loamy flood plains, moderately wet (Low willow/herb scrub)
Hogan, cool----------------------	Loamy high flood plains (White spruce/willow open forest)
ST41:	
Maclaren-------------------------	Stream terraces (Spruce/shrub birch woodland)
Sinona---------------------------	Stream terraces (Spruce/shrub birch woodland)
ST411:	
Maclaren-------------------------	Stream terraces (Spruce/shrub birch woodland)
Kuslinad, very wet---------------	Terraces, wet (Black spruce/closed sheath cottongrass woodland)
Kuslinad-------------------------	Stream terraces, frozen (Spruce/spruce muskeg sedge open forest)
ST441:	
Kuslinad-------------------------	Stream terraces, frozen (Spruce/spruce muskeg sedge open forest)
Dackey, cool---------------------	Loamy flood plains, moderately wet (Low willow/herb scrub)
TS1:	
Cryaquepts-----------------------	Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)
TS3:	
Mankomen peat--------------------	Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest

Table 6. Ecological Sites Correlated to Soils (Continued)

Map unit symbol: Map unit component	Site name (Potential natural plant community)
TS12:	
Chelina	Glaciolacustrine uplands (Spruce/shrub birch woodland)
Mendna	Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)
TS14:	
Cryaquepts	Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)
Cryaquepts, very wet	Terraces, wet (Black spruce/closed sheath cottongrass woodland)

Table 7. Vegetation Map Unit Legend and Acreage

Symbol	Vegetation map unit name	Acres	Ha.	Pct.
EE0	Escarpments	1631	661	1.8
EE1	Escarpments (2)	1345	545	1.5
EE2	Escarpments (3)	2304	933	2.5
FA0	Tall thinleaf alder-feltleaf willow scrub : Balsam poplar/thinleaf alder open forest : White spruce/thinleaf alder open forest	2303	933	2.5
FA1	White spruce/thinleaf alder open forest	106	43	0.1
FA2	Tall thinleaf alder-willow scrub : White spruce/thinleaf alder open forest : Sedge-grass riparian meadow	160	65	0.2
FA3	Tall thinleaf alder-willow scrub : White spruce/ericaceous shrub open forest	931	377	1.0
FW0	White spruce/willow open forest : Low willow/herb scrub	394	159	0.4
FW1	White spruce/willow open forest	519	210	0.6
FW2	White spruce/willow forest : Low willow/herb2 scrub	366	148	0.4
FW3	Low willow/herb scrub : White spruce/willow open forest	122	49	0.1
FW4	White spruce/willow open forest : Low willow/herb scrub (2)	123	50	0.1
FW5	Willow scrub complex	508	206	0.6
FW6	Sedge-grass riparian meadow : Low willow/herb scrub	55	22	0.1
FW7	Low willow/water sedge scrub	174	70	0.2
FW8	Willow scrub complex (2)	208	84	0.2
FW9	Low willow/herb scrub	57	23	0.1
MM0	Sedge wet meadow	532	215	0.6
MM1	Sedge wet meadow : Low shrub birch-willow/water sedge scrub	454	184	0.5
MM2	Spruce/shrub birch woodland : Sedge wet meadow : Low shrub birch-willow/water sedge scrub	801	325	0.9
MM3	Low shrub birch scrub : Sedge wet meadow	263	107	0.3
ST0	Black spruce/closed sheath cottongrass woodland : Spruce/shrub birch woodland : Sedge wet meadow	4562	1848	5.0
ST1	Spruce/shrub birch woodland	2472	1001	2.7
ST2	Spruce/shrub birch woodland : Sedge wet meadow	1257	509	1.4
ST3	Spruce/shrub birch woodland : Low shrub birch scrub : Sedge wet meadow	1271	515	1.4
ST4	Black spruce/closed sheath cottongrass woodland : Spruce/shrub birch woodland : Spruce/lichen woodland	1907	772	2.1
ST5	Spruce/shrub birch woodland : Low willow/herb scrub	416	168	0.5
ST6	Low willow/herb scrub (2)	103	42	0.1
ST7	Low shrub birch scrub	61	25	0.1
UB0	Spruce/shrub birch woodland (2)	11386	4611	12.4
UB1	Spruce woodland : Low shrub birch-willow/water sedge scrub	5547	2246	6.0
UB2	Spruce woodland : Tall alder scrub	1750	709	1.9
UB3	Spruce/willow woodland : Spruce/shrub birch woodland	213	86	0.2
UM0	Spruce/spruce muskeg sedge woodland	13788	5584	15.0
UM1	Spruce woodland complex	10114	4096	11.0
UM2	Low shrub birch scrub : Spruce woodland	2494	1010	2.7
US0	Low shrub birch scrub : Spruce/shrub birch woodland	2813	1139	3.0
US1	Low shrub birch/lichen scrub : Sparsely vegetated outwash	1142	462	1.2
US2	Low shrub birch/lichen scrub	577	234	0.6
US3	Quaking aspen-spruce forest : Spruce/shrub birch woodland	421	170	0.4
US4	Spruce woodland complex (2)	826	335	0.9
US5	Low shrub birch/lichen scrub (2)	97	39	0.1

Table 7. Vegetation Map Unit Legend and Acreage (Continued)

Symbol	Vegetation map unit name	Acres	Ha.	Pct.
US6	Spruce woodland complex (3)---	272	110	0.3
UT0	Spruce woodland : Low shrub birch-willow/water sedge scrub (2)------	7084	2869	7.7
UT1	Spruce woodland : Low shrub birch-willow/water sedge scrub (3)------	1225	496	1.3
UT2	Spruce woodland complex (4)---	1252	507	1.3
UT3	Black spruce/closed sheath cottongrass woodland : Sedge wet meadow--	637	258	0.7
UW0	White spruce/willow open forest : Low willow/herb scrub (3)---------	151	61	0.2
UW1	Low shrub birch-willow/water sedge scrub----------------------------	173	70	0.2
W	Open water : Aquatic herbaceous-------------------------------------	4513	1828	4.9
	Total Area	91880	37209	100.0

Table 8. Common Soils in Vegetation Map Units

Map unit symbol: Major components	Common soils
EE0:	
Spruce/shrub birch woodland	Cryorthents Cryochrepts
White spruce forest	Cryorthents Cryochrepts
Quaking aspen-white spruce forest	Cryochrepts
EE1:	
Spruce/shrub birch woodland	Cryorthents Cryochrepts
Low shrub birch scrub	Cryorthents Cryochrepts
EE2:	
Spruce/shrub birch woodland	Cryorthents Cryochrepts
Spruce/lichen woodland	Cryorthents Cryochrepts
Quaking aspen-white spruce forest	Cryorthents Cryochrepts
FA0:	
Tall thinleaf alder-feltleaf willow scrub	Dackey
Tall thinleaf alder scrub	Dackey
Balsam poplar/thinleaf alder open forest	Kluna, deep Klute, moderately wet Dackey
Balsam poplar-white spruce/thinleaf alder open forest	Kluna, deep Klute, moderately wet Dackey
White spruce/thinleaf alder open forest	Hogan
FA1:	
White spruce/thinleaf alder open forest	Hogan
FA2:	
Tall thinleaf alder/willow scrub	Dackey
White spruce/thinleaf alder open forest	Hogan
Sedge-grass riparian meadow	Swedna, very poorly drained
FA3:	
Tall thinleaf alder/willow scrub	Dackey
White spruce/ericaceous shrub open forest	Hogan Maclaren
FW0:	
White spruce/willow open forest	Kluna Klute Hogan

Table 8. Common Soils in Vegetation Map Units (Continued)

Map unit symbol: Major components	Common soils
FW0: (cont'd)	
Low willow/herb scrub	Dackey, cool Swedna
FW1:	
White spruce/willow open forest	Klute Kluna Klute, occasionally flooded
FW2:	
White spruce/willow open forest	Hogan, cool
Low willow/herb2 scrub	Sankluna
FW3:	
Low willow/herb scrub	Tangoe, frequently flooded
White spruce/willow open forest	Tangoe, occasionally flooded Klute, occasionally flooded
FW4:	
White spruce/willow open forest	Klute Kluna
Low willow/herb scrub	Klute Kluna
FW5:	
Sedge-grass riparian meadow	Swedna, very poorly drained
Low willow/water sedge scrub	Swedna, high elevation
Low willow/herb scrub	Swedna, high elevation
FW6:	
Sedge-grass riparian meadow	Aquatna
Low willow/herb scrub	Aquatna
FW7:	
Low willow/water sedge scrub	Swedna, high elevation Hisna
FW8:	
Low willow/herb scrub	Tangoe, wet, occasionally flooded
Tall feltleaf willow scrub	Tangoe, wet, soils
Sparsely vegetated alluvium	Tangoe, wet, frequently flooded
FW9:	
Low willow/herb scrub	Tangoe
MM0:	
Sedge wet meadow	Hufman Cryofibrists
MM1:	
Sedge wet meadow	Cryofibrists Hufman

Table 8. Common Soils in Vegetation Map Units (Continued)

Map unit symbol: Major components	Common soils
MM1: (cont'd)	
Low shrub birch-willow/water sedge scrub---------	Pergelic Cryohemists Cryofibrists
MM2:	
Spruce/shrub birch woodland----------------------	Pergelic Cryohemists Mendna Klasi
Sedge wet meadow---------------------------------	Cryohemists
Low shrub birch-willow/water sedge scrub---------	Ewan Pergelic Cryohemists
MM3:	
Low shrub birch scrub----------------------------	Pergelic Cryohemists, dry
Sedge wet meadow---------------------------------	Cryofibrists Hufman
ST0:	
Black spruce/closed sheath cottongrass woodland--	Kuslinad, very wet Haggard
Spruce/shrub birch woodland----------------------	Kuslinad Kusdry
Sedge wet meadow---------------------------------	Hufman
ST1:	
Spruce/shrub birch woodland----------------------	Kuslinad Maclaren
ST2:	
Spruce/shrub birch woodland----------------------	Kuslinad
Sedge wet meadow---------------------------------	Hufman
ST3:	
Spruce/shrub birch woodland----------------------	Ganhona Kuslinad
Low shrub birch scrub----------------------------	Ganhona Kuslinad
Sedge wet meadow---------------------------------	Hufman
ST4:	
Black spruce/closed sheath cottongrass woodland--	Kuslinad, very wet
Spruce/shrub birch woodland----------------------	Kuslinad Maclaren Kusdry
Spruce/lichen woodland---------------------------	Maclaren
ST5:	
Spruce/shrub birch woodland----------------------	Hogan, cool Maclaren
Low willow/herb scrub----------------------------	Dackey, cool

Table 8. Common Soils in Vegetation Map Units (Continued)

Map unit symbol: Major components	Common soils
ST6:	
Low willow/herb scrub	Ogtna
ST7:	
Low shrub birch scrub	Ogtna Chelina
UB0:	
Spruce/shrub birch woodland	Chelina Mendna Gadona Klasi Cryaquepts Cryochrepts
UB1:	
Spruce/shrub birch woodland	Mendna Cryaquepts Chelina Gadona
Spruce/spruce muskeg sedge open forest	Mendna Cryaquepts Chelina Gadona
Spruce/willow woodland	Cryaquepts Ewan Mendna
Low shrub birch-willow/water sedge scrub	Ewan
UB2:	
Spruce/willow woodland	Nickolna
Spruce/shrub birch woodland	Nickolna
Tall green alder scrub	Nickolna
UB3:	
Spruce/willow woodland	Cryaquepts
Spruce/shrub birch woodland	Cryaquepts
UM0:	
Spruce/spruce muskeg sedge open forest	Mendna Cryaquepts Chelina Klasi
UM1:	
Spruce/spruce muskeg sedge open forest	Klasi Cryaquepts
Spruce/shrub birch woodland	Gadona Mendna Chelina Cryaquepts Klasi

Table 8. Common Soils in Vegetation Map Units (Continued)

Map unit symbol: Major components	Common soils
UM2:	
Spruce/shrub birch woodland	Klasi Gadona Chelina Cobblank
Spruce/spruce muskeg sedge open forest	Klasi Gadona Chelina Cobblank
Low shrub birch scrub	Klasi Gadona Chelina Cobblank
US0:	
Low shrub birch scrub	Chelina Cobblank Mendna
Spruce/shrub birch woodland	Chelina Cobblank Mendna
US1:	
Low shrub birch/lichen scrub	Pippod, high elevation Chistna, high elevation
Sparsely vegetated outwash	Pippod, high elevation
US2:	
Low shrub birch/lichen scrub	Pippod, high elevation Chistna, high elevation Cobblank, cool
US3:	
Quaking aspen-white spruce forest	Chistna Pippod Mendna
Spruce/shrub birch woodland	Chistna Pippod Mendna
US4:	
Spruce/lichen woodland	Chistna
Spruce/shrub birch woodland	Chistna
US5:	
Low shrub birch/lichen scrub	Pippod Clarena
US6:	
Spruce/shrub birch woodland	Pippod Clarena
Spruce/lichen woodland	Pippod Clarena

Table 8. Common Soils in Vegetation Map Units (Continued)

Map unit symbol: Major components	Common soils
US6: (cont'd)	
Low shrub birch/lichen scrub	Pippod Clarena
UT0:	
Black spruce/closed sheath cottongrass woodland	Klasi, very wet Pergelic Cryohemists Mendna, very wet
Spruce/spruce muskeg sedge open forest	Klasi Mendna Cryaquepts
Low shrub birch-willow/water sedge scrub	Ewan Pergelic Cryohemists
UT1:	
Black spruce/closed sheath cottongrass woodland	Mendna, very wet Pergelic Cryohemists
Spruce/shrub birch woodland	Mendna
Low shrub birch-willow/water sedge scrub	Cryohemists Ewan Pergelic Cryohemists
UT2:	
Black spruce/closed sheath cottongrass	Swillna Klasi, very wet Kuslinad, very wet
Spruce/shrub birch woodland	Swillna, thin surface Klasi Kuslinad
UT3:	
Black spruce/closed sheath cottongrass woodland	Pergelic Cryohemists
Sedge wet meadow	Cryofibrists
UW0:	
White spruce/willow open forest	(not described)
Low willow/herb scrub	(not described)
UW1:	
Low shrub birch-willow/water sedge scrub	Ewan Pergelic Cryohemists
W:	
Open water	(not described)
Aquatic herbaceous	(not described)

Table 9. Recreational Development of Soils

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. Criteria used to rate primitive camp areas is included in the text.)

Map symbol and soil name	Camp areas (primitive)	All terrain vehicles	Paths and trails
AF1*:			
Pippod-------------------------	Slight-----------	Slight-----------	Slight-----------
Clarena------------------------	Slight-----------	Slight-----------	Slight-----------
AL1*:			
Cobblank, cool-----------------	Severe: slope.	Severe: slope.	Moderate: slope.
Rock outcrop.			
AL2*:			
Cobblank-----------------------	Slight-----------	Slight-----------	Slight-----------
Telay--------------------------	Slight-----------	Slight-----------	Slight-----------
AT1*:			
Chistna------------------------	Slight-----------	Slight-----------	Slight-----------
Pippod-------------------------	Slight-----------	Slight-----------	Slight-----------
BR1:			
Cobblank-----------------------	Severe: slope.	Moderate: slope.	Moderate: slope.
ESC1*:			
Cryorthents--------------------	Severe: slope.	Severe: slope.	Severe: slope.
Cryochrepts--------------------	Severe: slope.	Severe: slope.	Severe: slope.
FP1:			
Tangoe sandy loam, frequently flooded-----------------------	Moderate: too cobbly.	Moderate: too cobbly.	Moderate: too cobbly
FP2*:			
Dackey, cool-------------------	Slight-----------	Slight-----------	Slight-----------
Swedna-------------------------	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Swedna, very poorly drained-----	Severe: wetness.	Severe: wetness.	Severe: wetness.
FP3*:			
Dackey-------------------------	Slight-----------	Slight-----------	Slight-----------
Klute, moderately wet-----------	Slight-----------	Slight-----------	Slight-----------
FP4*:			
Dackey-------------------------	Slight-----------	Slight-----------	Slight-----------
Swedna, very poorly drained-----	Severe: wetness.	Severe: wetness.	Severe: wetness.

* See footnote at end of table.

Table 9. Recreational Development (Continued)

Map symbol and soil name	Camp areas (primitive)	All terrain vehicles	Paths and trails
FP6*:			
Aquatna, frequently flooded-----	Severe: wetness.	Severe: wetness.	Severe: wetness.
Hogan, cool---------------------	Moderate: permafrost.	Severe: permafrost.	Severe: permafrost.
FP12*:			
Tangoe, wet, occasionally flooded-	Moderate: too cobbly.	Moderate: too cobbly.	Moderate: too cobbly.
Tangoe, wet, frequently flooded-	Severe: wetness.	Moderate: too cobbly.	Moderate: too cobbly.
FP13*:			
Swedna, high elevation----------	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Hisna---------------------------	Severe: wetness.	Severe: wetness.	Severe: wetness.
FP21*:			
Swedna, high elevation----------	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Swedna, very poorly drained-----	Severe: wetness.	Severe: wetness.	Severe: wetness.
FP22*:			
Dackey, cool--------------------	Slight------------	Slight------------	Slight------------
Swedna, high elevation----------	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Kluna---------------------------	Slight------------	Slight------------	Slight------------
FP23*:			
Hogan, cool---------------------	Moderate: permafrost.	Severe: permafrost.	Severe: permafrost.
Sankluna------------------------	Moderate: slope.	Severe: too sandy.	Severe: too sandy.
FP31*:			
Kluna, deep---------------------	Slight------------	Slight------------	Slight------------
Hogan---------------------------	Moderate: permafrost.	Severe: permafrost.	Severe: permafrost.
Kluna, frequently flooded-------	Slight------------	Slight------------	Slight------------
FP32*:			
Dackey--------------------------	Slight------------	Slight------------	Slight------------
Hogan---------------------------	Moderate: permafrost.	Severe: permafrost.	Severe: permafrost.
Klute, moderately wet-----------	Slight------------	Slight------------	Slight------------

* See footnote at end of table.

Table 9. Recreational Development (Continued)

Map symbol and soil name	Camp areas (primitive)	All terrain vehicles	Paths and trails
GO1*:			
Pippod, high elevation----------	Severe: slope.	Moderate: slope.	Moderate: slope.
Chistna, high elevation---------	Severe: slope.	Moderate: slope.	Moderate: slope.
LC1:			
Klasi peat----------------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, wetness, excess humus.
LC2:			
Gadona silty clay---------------	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
LC5*:			
Klasi---------------------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, wetness, excess humus.
Klasi, very wet-----------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, wetness, excess humus.
LC6*:			
Swillna, thin surface-----------	Moderate: too clayey, permafrost.	Moderate: too clayey, permafrost.	Moderate: too clayey, permafrost.
Swillna-------------------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, slope, excess humus.
LL1*:			
Mendna--------------------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, wetness, excess humus.
Chelina-------------------------	Slight------------	Slight-----------	Slight------------
LL2*:			
Mendna--------------------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, wetness, excess humus.
Ewan----------------------------	Severe: wetness.	Severe: wetness.	Severe: wetness.
LL3:			
Gadona silty clay---------------	Moderate: too clayey, slope.	Moderate: too clayey, slope.	Moderate: slope, too clayey.

* See footnote at end of table.

Table 9. Recreational Development (Continued)

Map symbol and soil name	Camp areas (primitive)	All terrain vehicles	Paths and trails
LL12:			
Chelina loam--------------------	Slight------------	Slight------------	Slight------------
LL13:			
Chelina loam--------------------	Severe: slope.	Moderate: slope.	Moderate: slope.
LL41*:			
Pergelic Cryohemists, dry-------	Severe: permafrost, wetness, thermokarst.	Severe: permafrost, wetness, excess humus, thermokarst.	Severe: permafrost, slope, excess humus, thermokarst.
Cryofibrists--------------------	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness.
LL411*:			
Pergelic Cryohemists------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, slope, excess humus.
Mendna, very wet----------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, slope, excess humus.
Cryofibrists--------------------	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness.
MK1:			
Hufman peat---------------------	Severe: ponding.	Severe: ponding, excess humus.	Severe: excess humus, ponding.
MK2*:			
Pergelic Cryohemists------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, wetness, excess humus
Cryofibrists--------------------	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness.
SA1:			
Nickolna silt loam--------------	Moderate: slope.	Slight------------	Slight------------
SA3*:			
Goodview------------------------	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.			

* See footnote at end of table.

Table 9. Recreational Development (Continued)

Map symbol and soil name	Camp areas (primitive)	All terrain vehicles	Paths and trails
ST1*:			
Klute---------------------------	Slight------------	Slight------------	Slight------------
Kluna---------------------------	Slight------------	Slight------------	Slight------------
ST2*:			
Kuslinad------------------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, excess humus, wetness.
Pergelic Cryohemists, dry-------	Severe: permafrost, wetness, thermokarst.	Severe: permafrost, wetness, excess humus, thermokarst.	Severe: permafrost, slope, excess humus, thermokarst.
Hufman--------------------------	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.
ST3*:			
Dackey--------------------------	Slight------------	Slight------------	Slight------------
Hogan---------------------------	Moderate: permafrost.	Severe: permafrost.	Severe: permafrost.
ST4:			
Hogan fine sandy loam-----------	Moderate: permafrost.	Severe: permafrost.	Severe: permafrost.
ST5:			
Haggard peat--------------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, excess humus, wetness.
ST11*:			
Klute---------------------------	Slight------------	Slight------------	Slight------------
Tangoe, occasionally flooded----	Slight------------	Slight------------	Slight------------
ST12:			
Ogtna mucky fine sandy loam-----	Slight------------	Slight------------	Slight------------
ST13*:			
Tangoe, occasionally flooded----	Slight------------	Slight------------	Slight------------
Klute, occasionally flooded-----	Slight------------	Slight------------	Slight------------
ST21:			
Kuslinad peat-------------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, excess humus, wetness.

* See footnote at end of table.

Table 9. Recreational Development (Continued)

Map symbol and soil name	Camp areas (primitive)	All terrain vehicles	Paths and trails
ST22*:			
Kuslinad------------------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, excess humus, wetness.
Ganhona-------------------------	Severe: slope.	Moderate: slope.	Moderate: slope.
ST24*:			
Kuslinad------------------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, excess humus, wetness.
Kuslinad, very wet--------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, excess humus, wetness.
ST24B*:			
Kuslinad------------------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, excess humus, wetness.
Kuslinad, very wet--------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, excess humus, wetness.
Kusdry--------------------------	Slight------------	Slight------------	Slight------------
ST31*:			
Dackey, cool--------------------	Slight------------	Slight------------	Slight------------
Hogan, cool---------------------	Moderate: permafrost.	Severe: permafrost.	Severe: permafrost.
ST41*:			
Maclaren------------------------	Slight------------	Slight------------	Slight------------
Sinona--------------------------	Slight------------	Slight------------	Slight------------
ST411*:			
Maclaren------------------------	Slight------------	Slight------------	Slight------------
Kuslinad, very wet--------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, excess humus, wetness.
Kuslinad------------------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, excess humus, wetness.

* See footnote at end of table.

Table 9. Recreational Development (Continued)

Map symbol and soil name	Camp areas (primitive)	All terrain vehicles	Paths and trails
ST441*:			
Kuslinad------------------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, excess humus, wetness.
Dackey, cool--------------------	Slight------------	Slight------------	Slight------------
TS1:			
Cryaquepts----------------------	Severe: wetness.	Severe: wetness.	Severe: wetness.
TS3:			
Mankomen peat-------------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, slope, excess humus.
TS12*:			
Chelina-------------------------	Moderate: slope.	Moderate: slope.	Slight------------
Mendna--------------------------	Severe: permafrost, wetness.	Severe: permafrost, wetness, excess humus.	Severe: permafrost, wetness, excess humus.
TS14*:			
Cryaquepts----------------------	Severe: wetness.	Severe: wetness.	Severe: wetness.
Cryaquepts, very wet------------	Severe: wetness.	Severe: wetness.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 10. Habitat Suitability Ratings for Selected Wildlife Species and Habitat Elements

Map unit symbol: Major components	Moose			Caribou			Grizzly bear		
	Summer	Winter	Reproduction	Summer	Winter	Calving	Spring-summer	Summer-fall	Den sites
EE0:									
Spruce/shrub birch woodland	medium	some	medium	some	some	none	some	some	some
White spruce forest	some	some	some	none	some	none	some	some	high
Quaking aspen-white spruce forest	medium	some	some	some	some	none	some	some	some
EE1:									
Spruce/shrub birch woodland	medium	some	medium	some	some	none	some	some	some
Low shrub birch scrub	medium	medium	medium	some	some	none	medium	medium	none
EE2:									
Spruce/shrub birch woodland	medium	some	medium	some	some	none	some	some	some
Spruce/lichen woodland	some	some	medium	medium	medium	some	some	some	some
Quaking aspen-white spruce forest	medium	some	some	some	some	none	some	some	some
FA0:									
Tall thinleaf alder-feltleaf willow scrub	medium	some	medium	none	some	none	some	some	none
Tall thinleaf alder scrub	medium	some	medium	none	some	none	some	some	none
Balsam poplar/thinleaf alder open forest	medium	some	medium	none	some	none	some	some	some
Balsam poplar-white spruce/thinleaf alder open forest	some	none	high	none	some	none	medium	some	high
White spruce/thinleaf alder open forest	some	some	medium	some	some	none	some	some	medium
FA1:									
White spruce/thinleaf alder open forest	some	some	medium	some	some	none	some	some	medium
FA2:									
Tall thinleaf alder/willow scrub	medium	some	medium	none	some	none	some	some	none
White spruce/thinleaf alder open forest	some	some	medium	some	some	none	some	some	medium
Sedge-grass riparian meadow	high	some	medium	some	some	some	medium	medium	none
FA3:									
Tall thinleaf alder/willow scrub	medium	some	medium	none	some	none	some	some	none
White spruce/ericaceous shrub open forest	some	some	some	none	some	none	some	some	medium
FW0:									
Low willow/herb scrub	medium	medium	some	medium	medium	some	some	some	none
White spruce/willow open forest	some	some	medium	some	some	none	some	some	medium
FW1:									
White spruce/willow open forest	some	some	medium	some	some	none	some	some	medium
FW2:									
Low willow/herb2 scrub	medium	medium	some	medium	medium	some	some	some	none
White spruce/willow open forest	some	some	medium	some	some	none	some	some	medium

Table 10. Habitat Suitability Ratings for Selected Wildlife Species and Habitat Elements (Continued)

Map unit symbol: Major components	Moose			Caribou			Grizzly bear		
	Summer	Winter	Repro-duction	Summer	Winter	Calving	Spring-summer	Summer-fall	Den sites
FW3:									
Low willow/herb scrub	medium	medium	some	medium	medium	some	some	some	none
White spruce/willow open forest	some	some	medium	some	some	none	some	some	medium
FW4:									
Low willow/herb scrub	medium	medium	some	medium	medium	some	some	some	none
White spruce/willow open forest	some	some	medium	some	some	none	some	some	medium
FW5:									
Sedge-grass riparian meadow	high	some	medium	some	some	some	medium	medium	none
Low willow/water sedge scrub	high	some	some	some	some	some	some	some	none
Low willow/herb scrub	medium	medium	some	medium	medium	some	some	some	none
FW6:									
Sedge-grass riparian meadow	high	some	medium	some	some	some	medium	medium	none
Low willow/herb scrub	medium	medium	some	medium	medium	some	some	some	none
FW7:									
Low willow/water sedge scrub	high	some	some	some	some	some	some	some	none
FW8:									
Low willow/herb scrub	medium	medium	some	medium	medium	some	some	some	none
Tall feltleaf willow scrub	medium	some	medium	none	none	none	some	some	none
Sparsely vegetated alluvium	some	none	some	some	none	none	medium	medium	none
FW9:									
Low willow/herb scrub	medium	medium	some	medium	medium	some	some	some	none
MM0:									
Sedge wet meadow	high	some	medium	medium	some	medium	some	some	none
MM1:									
Sedge wet meadow	high	some	medium	medium	some	medium	some	some	none
Low shrub birch-willow/water sedge scrub	high	some	medium	some	some	none	some	some	none
MM2:									
Spruce/shrub birch woodland	medium	some	medium	some	some	none	some	some	some
Sedge wet meadow	high	some	medium	medium	some	medium	some	some	none
Low shrub birch-willow/water sedge scrub	high	some	medium	some	some	none	some	some	none
MM3:									
Sedge wet meadow	high	some	medium	medium	some	medium	some	some	none
Low shrub birch scrub	medium	medium	medium	some	some	none	medium	medium	none
ST0:									
Black spruce/closed sheath cottongrass woodland	some	some	some	some	some	none	some	some	some
Spruce/shrub birch woodland	medium	some	medium	some	some	none	some	some	some

Table 10. Habitat Suitability Ratings for Selected Wildlife Species and Habitat Elements (Continued)

Map unit symbol: Major components	Moose			Caribou			Grizzly bear		
	Summer	Winter	Reproduction	Summer	Winter	Calving	Spring-summer	Summer-fall	Den sites
ST0: (cont'd)									
Sedge wet meadow	high	some	medium	medium	some	medium	some	some	none
ST1:									
Spruce/shrub birch woodland	medium	some	medium	some	some	none	some	some	some
ST2:									
Spruce/shrub birch woodland	medium	some	medium	some	some	none	some	some	some
Sedge wet meadow	high	some	medium	medium	some	medium	some	some	none
ST3:									
Spruce/shrub birch woodland	medium	some	medium	some	some	none	some	some	some
Low shrub birch scrub	medium	medium	medium	some	some	none	medium	medium	none
Sedge wet meadow	high	some	medium	medium	some	medium	some	some	none
ST4:									
Black spruce/closed sheath cottongrass woodland	some	some	some	some	some	none	some	some	some
Spruce/shrub birch woodland	medium	some	medium	some	some	none	some	some	some
Spruce/lichen woodland	some	some	medium	medium	medium	some	some	some	some
ST5:									
Spruce/shrub birch woodland	medium	some	medium	some	some	none	some	some	Some
Low willow/herb scrub	medium	medium	some	medium	medium	some	some	some	None
ST6:									
Low willow/herb scrub	medium	medium	some	medium	medium	some	some	some	None
ST7:									
Low shrub birch scrub	medium	medium	medium	some	some	none	medium	medium	None
UB0:									
Spruce/shrub birch woodland	medium	some	medium	some	some	none	some	some	Some
UB1:									
Spruce/shrub birch woodland	medium	some	medium	some	some	none	some	some	Some
Spruce/spruce muskeg sedge open forest	medium	some	medium	none	some	none	some	some	None
Spruce/willow woodland	medium	medium	medium	some	some	none	some	some	Some
Low shrub birch-willow/water sedge scrub	high	some	medium	some	some	none	some	some	None
UB2:									
Spruce/willow woodland	medium	medium	medium	some	some	none	some	some	some
Spruce/shrub birch woodland	medium	some	medium	some	some	none	some	some	some
Tall green alder scrub	medium	some	medium	none	none	none	some	some	none
UB3:									
Spruce/willow woodland	medium	medium	medium	some	some	none	some	some	some
Spruce/shrub birch woodland	medium	some	medium	some	some	none	some	some	some

Table 10. Habitat Suitability Ratings for Selected Wildlife Species and Habitat Elements (Continued)

Map unit symbol: Major components	Moose			Caribou			Grizzly bear		
	Summer	Winter	Repro-duction	Summer	Winter	Calving	Spring-summer	Summer-fall	Den sites
UM0:									
Spruce/spruce muskeg sedge open forest---	medium	some	medium	none	some	none	some	some	none
UM1:									
Spruce/spruce muskeg sedge open forest---	medium	some	medium	none	some	none	some	some	none
Spruce/shrub birch woodland--------------	medium	some	medium	some	some	none	some	some	some
UM2:									
Spruce/shrub birch woodland--------------	medium	some	medium	some	some	none	some	some	some
Spruce/spruce muskeg sedge open forest---	medium	some	medium	none	some	none	some	some	none
Low shrub birch scrub--------------------	medium	medium	medium	some	some	none	medium	medium	none
US0:									
Low shrub birch scrub--------------------	medium	medium	medium	some	some	none	medium	medium	none
Spruce/shrub birch woodland--------------	medium	some	medium	some	some	none	some	some	some
US1:									
Low shrub birch/lichen scrub-------------	some	some	none	medium	high	medium	medium	medium	some
Sparsely vegetated outwash---------------	some	none	none	some	some	none	some	some	none
US2:									
Low shrub birch/lichen scrub-------------	some	some	none	medium	high	medium	medium	medium	some
US3:									
Quaking aspen-white spruce forest--------	medium	some	some	some	some	none	some	some	some
Spruce/shrub birch woodland--------------	medium	some	medium	some	some	none	some	some	some
US4:									
Spruce/lichen woodland-------------------	some	some	medium	medium	medium	some	some	some	some
Spruce/shrub birch woodland--------------	medium	some	medium	some	some	none	some	some	some
US5:									
Low shrub birch/lichen scrub-------------	some	some	none	medium	high	medium	medium	medium	some
US6:									
Spruce/shrub birch woodland--------------	medium	some	medium	some	some	none	some	some	some
Spruce/lichen woodland-------------------	some	some	medium	medium	medium	some	some	some	some
Low shrub birch scrub--------------------	medium	medium	medium	some	some	none	medium	medium	none
UT0:									
Black spruce/closed sheath cottongrass woodland------------------------------	some	some	some	some	some	none	some	some	some
Spruce/spruce muskeg sedge open forest---	medium	some	medium	none	some	none	some	some	none
Low shrub birch-willow/water sedge scrub-	high	some	medium	some	some	none	some	some	none
UT1:									
Black spruce/closed sheath cottongrass woodland------------------------------	some	some	some	some	some	none	some	some	some
Spruce/shrub birch woodland--------------	medium	some	medium	some	some	none	some	some	some

Table 10. Habitat Suitability Ratings for Selected Wildlife Species and Habitat Elements (Continued)

Map unit symbol: Major components	Moose			Caribou			Grizzly bear		
	Summer	Winter	Repro-duction	Summer	Winter	Calving	Spring-summer	Summer-fall	Den sites
UT1: (cont'd)									
Low shrub birch-willow/water sedge scrub-	high	some	medium	some	some	none	some	some	none
UT2:									
Black spruce/closed sheath cottongrass woodland-------------------------------	some	some	some	some	some	none	some	some	some
Spruce/shrub birch woodland--------------	medium	some	medium	some	some	none	some	some	some
UT3:									
Black spruce/closed sheath cottongrass woodland-------------------------------	some	some	some	some	some	none	some	some	some
Sedge wet meadow-------------------------	high	some	medium	medium	some	medium	some	some	none
UW0:									
White spruce/willow open forest----------	some	some	medium	some	some	none	some	some	medium
Low willow/herb scrub--------------------	medium	medium	some	medium	medium	some	some	some	none
UW1:									
Low shrub birch-willow/water sedge scrub-	high	some	medium	some	some	none	some	some	none
W:									
Open water-------------------------------	some	none	none	none	none	none	none	none	none
Aquatic herbaceous-----------------------	medium	some	some	none	some	none	medium	medium	Some

Table 11. Engineering Index Properties of Soils

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
AF1*:												
Pippod------	0-1	Silt loam--------	ML	A-4	0	0	100	95-100	80-95	55-75	25-30	NP-5
	1-8	Fine sandy loam.	SM, ML	A-2, A-4	0	0-10	85-100	80-100	50-70	20-40	---	NP
	8-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly sand.	GP, GP-GM	A-1	0	15-30	40-50	20-45	10-25	0-5	---	NP
Clarena-----	0-3	Silt loam--------	ML	A-5	0	0	95-100	95-100	90-100	75-90	40-50	NP-5
	3-18	Fine sandy loam, loam.	ML, SM	A-4	0	0-5	95-100	90-100	70-85	45-60	10-15	NP-5
	18-60	Very gravelly sand, extremely gravelly sand, extremely cobbly coarse sand.	GP-GM, SP-SM	A-1	0-10	10-50	35-60	25-45	15-35	5-10	---	NP
AL1*:												
Cobblank, cool	0-1	Silt loam--------	ML	A-4	0	0	100	100	95-100	70-90	25-30	NP-5
	1-10	Gravelly sandy loam, cobbly sandy loam, gravelly loam.	SM, GM	A-1, A-2, A-4	0	0-35	65-95	55-70	35-65	20-50	20-25	NP-5
	10-18	Very gravelly loam, very channery sandy loam, very cobbly sandy loam.	GM, SM	A-1, A-2, A-4	0-5	10-60	65-95	20-50	20-45	15-45	20-25	NP-5
	18-22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Rock outcrop.												
AL2*:												
Cobblank----	0-1	Silt loam--------	ML	A-4	0	0	100	100	95-100	70-90	25-30	NP-5
	1-10	Gravelly sandy loam, cobbly sandy loam, gravelly loam.	SM, GM	A-1, A-2, A-4	0	0-35	65-95	55-70	35-65	20-50	20-25	NP-5
	10-18	Very gravelly loam, very channery sandy loam, very cobbly sandy loam.	GM, SM	A-1, A-2, A-4	0-5	10-60	65-95	20-50	20-45	15-45	20-25	NP-5
	18-22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---

* See footnote at end of table.

Table 11. Engineering Index Properties (Continued)

Map symbol and soil name	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
AL2*: (cont'd)												
Telay-------	0-2	Silt loam--------	ML	A-4	0	0	100	100	95-100	70-90	25-30	NP-5
	2-11	Loam, gravelly loam, gravelly sandy loam.	SM, ML, CL-ML	A-2, A-4	0	0-15	70-100	55-90	35-80	25-55	10-15	NP-5
	11-60	Very gravelly sandy loam, very gravelly loam, very cobbly loam.	GM, SM	A-2, A-1	0	0-30	50-70	35-60	20-45	15-35	---	NP
AT1*:												
Chistna-----	0-1	Silt loam--------	ML	A-4	0	0-5	95-100	90-100	85-100	70-85	25-30	NP-5
	1-4	Fine sandy loam, sandy loam.	SM, ML	A-2, A-4	0	0	100	90-100	50-80	25-55	---	NP
	4-60	Loamy fine sand, sand.	SM	A-2	0	0	100	90-100	60-80	15-25	---	NP
Pippod------	0-1	Silt loam--------	ML	A-4	0	0	100	95-100	80-95	55-75	25-30	NP-5
	1-8	Fine sandy loam.	SM, ML	A-2, A-4	0	0-10	85-100	80-100	50-70	20-40	---	NP
	8-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly sand.	GP, GP-GM	A-1	0	15-30	40-50	20-45	10-25	0-5	---	NP
BR1:												
Cobblank----	0-1	Silt loam--------	ML	A-4	0	0	100	100	95-100	70-90	25-30	NP-5
	1-10	Gravelly sandy loam, cobbly sandy loam, gravelly loam.	SM, GM	A-1, A-2, A-4	0	0-35	65-95	55-70	35-65	20-50	20-25	NP-5
	10-18	Very gravelly loam, very channery sandy loam, very cobbly sandy loam.	GM, SM	A-1, A-2, A-4	0-5	10-60	65-95	20-50	20-45	15-45	20-25	NP-5
	18-22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
ESC1*:												
Cryorthents-	0-1	Loam------------	ML	A-4	0	0-25	75-100	65-95	60-85	50-65	30-50	NP-20
	1-60	Variable---------	---	---	0	0-25	---	---	---	---	---	---
Cryochrepts-	0-1	Silt loam--------	ML, SM	A-4	0	0-5	95-100	90-100	70-85	45-60	30-50	NP-20
	1-60	Variable---------	---	---	0	0-25	---	---	---	---	---	---
FP1:												
Tangoe sandy loam, frequently flooded	0-1	Sandy loam-------	SM	A-4	0	0	95-100	90-100	75-85	35-50	---	---
	1-8	Stratified sand to silt.	SM	A-4	0	0	90-100	85-100	75-85	35-50	---	---

* See footnote at end of table.

Table 11. Engineering Index Properties (Continued)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number-: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
FP1:												
Tangoe sandy loam, frequently flooded (cont'd)	8-60	Extremely gravelly coarse sand, very gravelly sand, very cobbly coarse sand.	GP, SP	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	---
FP2*:												
Dackey, cool	0-7	Fine sandy loam.	ML, SM	A-4	0	0	100	100	80-90	45-65	15-20	NP-5
	7-27	Stratified sand to silt.	SM	A-2, A-4	0	0	100	100	80-90	30-50	10-15	NP-5
	27-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, GP-GM, SP-SM	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	NP
Swedna------	0-1	Fine sandy loam.	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	15-20	NP-5
	1-31	Stratified sand to silt.	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	10-15	NP-5
	31-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, GP-GM, SP-SM	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	NP
Swedna, very poorly drained	0-1	Fine sandy loam.	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	15-20	NP-5
	1-31	Stratified sand to silt.	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	10-15	NP-5
	31-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, GP-GM, SP-SM	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	NP
FP3*:												
Dackey------	0-7	Fine sandy loam.	ML, SM	A-4	0	0	100	100	80-90	45-65	15-20	NP-5
	7-27	Stratified sand to silt.	SM	A-2, A-4	0	0	100	100	80-90	30-50	10-15	NP-5
	27-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, GP-GM, SP-SM	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	NP
Klute, moderately wet	0-3	Fine sandy loam.	ML	A-4	0	0	100	100	85-100	50-70	15-20	NP-5
	3-25	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	70-85	45-60	10-15	NP-5

* See footnote at end of table.

Table 11. Engineering Index Properties (Continued)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number-: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
FP3*:												
Klute, moderately wet (cont'd)	25-60	Very gravelly sand, extremely gravelly coarse sand, extremely cobbly sand.	GP-GM, SP-SM	A-1	0-10	10-50	35-60	25-45	15-35	5-10	---	NP
FP4*:												
Dackey------	0-7	Fine sandy loam.	ML, SM	A-4	0	0	100	100	80-90	45-65	15-20	NP-5
	7-27	Stratified sand to silt.	SM	A-2, A-4	0	0	100	100	80-90	30-50	10-15	NP-5
	27-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, GP-GM, SP-SM	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	NP
Swedna, very poorly drained	0-1	Fine sandy loam.	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	15-20	NP-5
	1-31	Stratified sand to silt.	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	10-15	NP-5
	31-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, GP-GM, SP-SM	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	NP
FP6*:												
Aquatna, frequently flooded	0-6	Loam-------------	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	10-15	NP-5
	6-60	Stratified sand to silt.	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	10-15	NP-5
Hogan, cool-	0-9	Fine sandy loam.	ML	A-4	0	0	100	100	75-95	50-70	15-20	NP-5
	9-25	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	70-85	45-60	10-15	NP-5
	25-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
FP12*:												
Tangoe, wet, occasionally flooded	0-7	Very gravelly coarse sand.	GP, SP	A-1	0	0	50-65	25-50	10-25	0-5	---	---
	7-60	Extremely gravelly coarse sand, very gravelly sand, very cobbly coarse sand.	GP, SP	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	---
Tangoe, wet, frequently flooded	0-7	Very gravelly coarse sand.	GP, SP	A-1	0	0	50-65	25-50	10-25	0-5	---	---
	7-60	Extremely gravelly coarse sand, very gravelly sand, very cobbly coarse sand.	GP, SP	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	---

* See footnote at end of table.

Table 11. Engineering Index Properties (Continued)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
FP13*:												
Swedna, high elevation	0-1	Fine sandy loam.	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	15-20	NP-5
	1-31	Stratified sand to silt.	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	10-15	NP-5
	31-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, GP-GM, SP-SM	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	NP
Hisna-------	0-12	Peat-------------	PT	A-8	---	---	---	---	---	---	---	---
	12-21	Stratified sand to silt.	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	---	NP
	21-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly coarse sand.	GP, GP-GM, SP-SM	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	NP
FP21*:												
Swedna, high elevation	0-1	Fine sandy loam.	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	15-20	NP-5
	1-31	Stratified sand to silt.	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	10-15	NP-5
	31-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, GP-GM, SP-SM	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	NP
Swedna, very poorly drained	0-1	Fine sandy loam.	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	15-20	NP-5
	1-31	Stratified sand to silt.	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	10-15	NP-5
	31-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, GP-GM, SP-SM	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	NP
FP22*:												
Dackey, cool	0-7	Fine sandy loam.	ML, SM	A-4	0	0	100	100	80-90	45-65	15-20	NP-5
	7-27	Stratified sand to silt.	SM	A-2, A-4	0	0	100	100	80-90	30-50	10-15	NP-5
	27-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, GP-GM, SP-SM	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	NP
Swedna, high elevation	0-1	Fine sandy loam.	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	15-20	NP-5
	1-31	Stratified sand to silt.	SM	A-2, A-4	0	0	100	95-100	80-90	30-50	10-15	NP-5

* See footnote at end of table.

Table 11. Engineering Index Properties (Continued)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number-: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
FP22*:												
Swedna, high elevation (cont'd)	31-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, GP-GM, SP-SM	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	NP
Kluna-------	0-3	Silt loam--------	ML, SM	A-4	0	0	100	95-100	85-100	45-65	15-20	NP-5
	3-45	Stratified silt to sand.	ML, SM	A-4	0	0	100	95-100	70-85	45-60	10-15	NP-5
	45-60	Very gravelly coarse sand, extremely gravelly sand, extremely cobbly sand.	GP-GM, SP-SM	A-1	0-10	10-50	35-60	25-45	15-35	5-10	---	NP
FP23*:												
Hogan, cool-	0-9	Fine sandy loam.	ML	A-4	0	0	100	100	75-95	50-70	15-20	NP-5
	9-25	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	70-85	45-60	10-15	NP-5
	25-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
Sankluna----	0-11	Fine sandy loam.	ML, SM	A-4	0	0	100	95-100	65-85	40-60	10-15	NP-5
	11-43	Stratified fine sand to sand.	SM, SP-SM	A-2	0	0	95-100	90-100	60-75	10-25	---	---
	43-60	Stratified sand to silt.	SM	A-2, A-4	0	0	95-100	95-100	65-85	30-50	---	NP
FP31*:												
Kluna, deep-	0-3	Fine sandy loam.	ML, SM	A-4	0	0	100	95-100	75-90	45-65	15-20	NP-5
	3-60	Stratified silt to sand.	SM	A-2, A-4	0	0	100	100	80-90	30-50	10-15	NP-5
Hogan-------	0-9	Fine sandy loam.	ML	A-4	0	0	100	100	75-95	50-70	15-20	NP-5
	9-25	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	70-85	45-60	10-15	NP-5
	25-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
Kluna, frequently flooded	0-2	Fine sandy loam.	ML, SM	A-4	0	0	100	95-100	85-100	45-65	10-15	NP-5
	2-60	Stratified silt to sand.	ML, SM	A-4	0	0	95-100	90-100	70-85	45-60	10-15	NP-5
FP32*:												
Dackey------	0-7	Fine sandy loam.	ML, SM	A-4	0	0	100	100	80-90	45-65	15-20	NP-5
	7-27	Stratified sand to silt.	SM	A-2, A-4	0	0	100	100	80-90	30-50	10-15	NP-5
	27-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, GP-GM, SP-SM	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	NP

* See footnote at end of table.

Table 11. Engineering Index Properties (Continued)

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number-				Liquid limit	Plas- ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
FP32*: (cont'd)												
Hogan-------	0-9	Fine sandy loam.	ML	A-4	0	0	100	100	75-95	50-70	15-20	NP-5
	9-25	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	70-85	45-60	10-15	NP-5
	25-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
Klute, moderately wet	0-3	Fine sandy loam.	ML	A-4	0	0	100	100	85-100	50-70	15-20	NP-5
	3-25	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	70-85	45-60	10-15	NP-5
	25-60	Very gravelly sand, extremely gravelly coarse sand, extremely cobbly sand.	GP-GM, SP-SM	A-1	0-10	10-50	35-60	25-45	15-35	5-10	---	NP
GO1*:												
Pippod, high elevation	0-1	Silt loam--------	ML	A-4	0	0	100	95-100	80-95	55-75	25-30	NP-5
	1-8	Fine sandy loam.	SM, ML	A-2, A-4	0	0-10	85-100	80-100	50-70	20-40	---	NP
	8-60	Very gravelly coarse sand, extremely gravelly coarse sand, extremely cobbly sand.	GP, GP-GM	A-1	0	15-30	40-50	20-45	10-25	0-5	---	NP
Chistna, high elevation	0-1	Silt loam--------	ML	A-4	0	0-5	95-100	90-100	85-100	70-85	25-30	NP-5
	1-4	Fine sandy loam, sandy loam.	SM, ML	A-2, A-4	0	0	100	90-100	50-80	25-55	---	NP
	4-60	Loamy fine sand, sand.	SM	A-2	0	0	100	90-100	60-80	15-25	---	NP
LC1:												
Klasi peat--	0-9	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	9-11	Silty clay loam, silty clay, clay loam.	CL	A-6, A-7	0	0-10	90-100	85-100	80-95	60-85	30-50	15-35
	11-32	Silty clay, clay, cobbly clay loam.	CL	A-6, A-7	0	0-15	90-100	85-100	80-95	60-85	30-50	15-35
	32-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
LC2:												
Gadona silty clay	0-11	Silty clay-------	CL	A-6, A-7	0	0-15	90-100	70-100	65-95	60-90	30-50	15-35
	11-60	Silty clay, silty clay loam, cobbly clay.	CL	A-6, A-7	0	0-15	90-100	70-100	65-95	60-90	30-50	15-35
LC5*:												
Klasi-------	0-9	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	9-11	Silty clay loam, silty clay, clay loam.	CL	A-6, A-7	0	0-10	90-100	85-100	80-95	60-85	30-50	15-35

* See footnote at end of table.

Table 11. Engineering Index Properties (Continued)

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number-				Liquid limit	Plas- ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
LC5*:												
Klasi------- (cont'd)	11-32	Silty clay, clay, cobbly clay loam.	CL	A-6, A-7	0	0-15	90-100	85-100	80-95	60-85	30-50	15-35
	32-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
Klasi, very wet	0-9	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	9-11	Silty clay loam, silty clay, clay loam.	CL	A-6, A-7	0	0-10	90-100	85-100	80-95	60-85	30-50	15-35
	11-32	Silty clay, clay, cobbly clay loam.	CL	A-6, A-7	0	0-15	90-100	85-100	80-95	60-85	30-50	15-35
	32-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
LC6*:												
Swillna, thin surface	0-6	Silty clay loam.	CL	A-6, A-7	0	0-10	90-100	85-100	80-95	75-90	30-50	15-35
	6-38	Silty clay loam.	CL	A-6, A-7	0	0-10	90-100	85-100	80-95	75-90	30-50	15-35
Swillna-----	0-9	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	9-18	Silty clay loam.	CL	A-6, A-7	0	0-10	90-100	85-100	80-95	75-90	30-50	15-35
	18-21	Mucky peat-------	PT	A-8	0	0-5	---	---	---	---	---	---
	21-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
LL1*:												
Mendna------	0-9	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	9-20	Clay loam, gravelly loam, silty clay loam.	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15
	20-48	Clay loam, gravelly loam, silty clay loam.	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15
	48-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
Chelina-----	0-1	Loam-------------	CL	A-6	0	0-5	75-100	65-95	60-85	55-75	30-35	10-15
	1-60	Gravelly clay loam, loam, sandy clay loam.	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15
LL2*:												
Mendna------	0-9	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	9-20	Clay loam, gravelly loam, silty clay loam.	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15
	20-48	Clay loam, gravelly loam, silty clay loam.	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15
	48-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---

* See footnote at end of table.

Table 11. Engineering Index Properties (Continued)

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number-				Liquid limit	Plas- ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
LL2*: (cont'd)												
Ewan--------	0-4	Silt loam--------	CL	A-6	0	0-15	95-100	95-100	80-95	75-90	30-35	10-15
	4-60	Silty clay loam, loam, gravelly clay loam.	CL	A-6	0	0-15	75-100	70-95	60-85	55-75	30-35	10-15
LL3:												
Gadona silty clay	0-11	Silty clay-------	CL	A-6, A-7	0	0-15	90-100	70-100	65-95	60-90	30-50	15-35
	11-60	Silty clay, silty clay loam, cobbly clay.	CL	A-6, A-7	0	0-15	90-100	70-100	65-95	60-90	30-50	15-35
LL12, LL13:												
Chelina loam	0-1	Loam-------------	CL	A-6	0	0-5	75-100	65-95	60-85	55-75	30-35	10-15
	1-60	Gravelly clay loam, loam, sandy clay loam.	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15
LL41*, LL411*:												
Pergelic Cryohemists	0-27	Peat-------------	PT	A-8	0	0	---	---	---	---	---	NP
	27-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
Mendna, very wet	0-9	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	9-20	Clay loam, gravelly loam, silty clay loam.	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15
	20-48	Clay loam, gravelly loam, silty clay loam.	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15
	48-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
Cryofibrists	0-29	Peat-------------	PT	A-8	0	0	---	---	---	---	---	NP
	29-60	Variable---------	---	---	---	---	---	---	---	---	---	---
MK1:												
Hufman peat-	0-26	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	NP
	26-60	Stratified fine sand to silt.	ML, SM	A-4	---	0-5	100	90-100	70-85	45-60	15-20	NP-5
MK2*:												
Pergelic Cryohemists	0-27	Peat-------------	PT	A-8	0	0	---	---	---	---	---	NP
	27-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
Cryofibrists	0-29	Peat-------------	PT	A-8	0	0	---	---	---	---	---	NP
	29-60	Variable---------	---	---	---	---	---	---	---	---	---	---
SA1:												
Nickolna silt loam	0-8	Silt loam--------	ML	A-5	0	0-5	95-100	95-100	90-100	75-90	40-50	NP-5
	8-60	Clay loam, gravelly loam, cobbly clay loam.	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15

* See footnote at end of table.

Table 11. Engineering Index Properties (Continued)

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number-				Liquid limit	Plas- ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
SA3*:												
Goodview----	0-2	Silt loam--------	ML	A-5	0	0-5	100	95-100	90-100	75-90	25-35	NP-5
	2-7	Silt loam, gravelly silt loam.	SM, ML, GP	A-4	---	0-10	70-90	60-85	40-60	40-60	20-30	NP-10
	7-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Rock outcrop.												
ST1*:												
Klute-------	0-5	Very fine sandy loam.	ML	A-4	0	0	100	100	85-100	60-75	20-30	NP-10
	5-33	Stratified silt to sand.	ML, SM	A-4	0	0-5	100	95-100	80-95	45-60	10-15	NP-5
	33-60	Very gravelly sand, extremely gravelly coarse sand, extremely cobbly sand.	GP-GM, SP-SM	A-1	0-10	10-50	35-60	25-45	15-35	5-10	---	NP
Kluna-------	0-3	Fine sandy loam.	ML, SM	A-4	0	0	100	95-100	85-100	45-65	15-20	NP-5
	3-45	Stratified silt to sand.	ML, SM	A-4	0	0	100	95-100	70-85	45-60	10-15	NP-5
	45-60	Very gravelly coarse sand, extremely gravelly sand, extremely cobbly sand.	GP-GM, SP-SM	A-1	0-10	10-50	35-60	25-45	15-35	5-10	---	NP
ST2*:												
Kuslinad----	0-8	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	8-17	Silt loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	0	100	90-100	85-100	50-70	15-20	NP-5
	17-27	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	65-80	40-60	15-20	NP-5
	27-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
Pergelic Cryohemists, dry	0-27	Peat-------------	PT	A-8	0	0	---	---	---	---	---	NP
	27-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
Hufman------	0-26	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	NP
	26-60	Stratified fine sand to silt.	ML, SM	A-4	---	0-5	100	90-100	70-85	45-60	15-20	NP-5
ST3*:												
Dackey------	0-7	Fine sandy loam.	ML, SM	A-4	0	0	100	100	80-90	45-65	15-20	NP-5
	7-27	Stratified sand to silt.	SM	A-2, A-4	0	0	100	100	80-90	30-50	10-15	NP-5

* See footnote at end of table.

Table 11. Engineering Index Properties (Continued)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
ST3*:												
Dackey------ (cont'd)	27-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, GP-GM, SP-SM	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	NP
Hogan-------	0-9	Fine sandy loam.	ML	A-4	0	0	100	100	75-95	50-70	15-20	NP-5
	9-25	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	70-85	45-60	10-15	NP-5
	25-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
ST4:												
Hogan fine sandy loam	0-9	Fine sandy loam.	ML	A-4	0	0	100	100	75-95	50-70	15-20	NP-5
	9-25	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	70-85	45-60	10-15	NP-5
	25-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
ST5:												
Haggard peat	0-24	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	24-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
ST11*:												
Klute-------	0-5	Very fine sandy loam.	ML	A-4	0	0	100	100	85-100	60-75	20-30	NP-10
	5-33	Stratified silt to sand.	ML, SM	A-4	0	0-5	100	95-100	80-95	45-60	10-15	NP-5
	33-60	Very gravelly sand, extremely gravelly coarse sand, extremely cobbly sand.	GP-GM, SP-SM	A-1	0-10	10-50	35-60	25-45	15-35	5-10	---	NP
Tangoe, occasionally flooded	0-3	Silt loam--------	ML	A-4	0	0	95-100	90-100	85-95	55-70	---	---
	3-60	Extremely gravelly coarse sand, very gravelly sand, very cobbly coarse sand.	GP, SP	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	---
ST12:												
Ogtna mucky fine sandy loam	0-4	Mucky fine sandy loam.	SM, ML	A-4	0	0	100	95-100	85-100	40-65	15-20	NP-5
	4-13	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	70-85	45-60	10-15	NP-5
	13-60	Very gravelly sand, extremely gravelly coarse sand, extremely cobbly sand.	GP-GM, SP-SM	A-1	0-10	10-50	35-60	25-45	15-35	5-10	---	NP

* See footnote at end of table.

Table 11. Engineering Index Properties (Continued)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number-: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
ST13*:												
Tangoe, occasionally flooded	0-1	Fine sandy loam.	SM	A-4	0	0	95-100	90-100	75-85	35-50	---	---
	1-8	Stratified sand to silt.	SM	A-4	0	0	90-100	85-100	75-85	35-50	---	---
	8-60	Extremely gravelly coarse sand, very gravelly sand, very cobbly coarse sand.	GP, SP	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	---
Klute, occasionally flooded	0-5	Silt loam--------	ML	A-4	0	0	100	100	85-100	60-75	20-30	NP-10
	5-33	Stratified silt to sand.	ML, SM	A-4	0	0-5	100	95-100	80-95	45-60	10-15	NP-5
	33-60	Very gravelly sand, extremely gravelly coarse sand, extremely cobbly sand.	GP-GM, SP-SM	A-1	0-10	10-50	35-60	25-45	15-35	5-10	---	NP
ST21:												
Kuslinad peat	0-8	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	8-17	Silt loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	0	100	90-100	85-100	50-70	15-20	NP-5
	17-27	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	65-80	40-60	15-20	NP-5
	27-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
ST22*:												
Kuslinad----	0-8	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	8-17	Silt loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	0	100	90-100	85-100	50-70	15-20	NP-5
	17-27	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	65-80	40-60	15-20	NP-5
	27-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
Ganhona-----	0-2	Silt loam--------	ML	A-5	0	0	95-100	95-100	90-100	75-90	40-50	NP-5
	2-52	Stratified sand to silt.	ML, SM	A-4	0	0-5	95-100	90-100	70-85	45-60	10-15	NP-5
	52-60	Stratified fine sand to sand.	SM, SP-SM	A-2	0	0	95-100	90-100	60-75	10-25	10-15	NP-5
ST24*:												
Kuslinad----	0-8	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	8-17	Silt loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	0	100	90-100	85-100	50-70	15-20	NP-5
	17-27	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	65-80	40-60	15-20	NP-5
	27-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---

* See footnote at end of table.

Table 11. Engineering Index Properties (Continued)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
ST24*: (cont'd)												
Kuslinad, very wet	0-8	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	8-17	Silt loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	0	100	90-100	85-100	50-70	15-20	NP-5
	17-27	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	65-80	40-60	15-20	NP-5
	27-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
ST24B*:												
Kuslinad----	0-8	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	8-17	Silt loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	0	100	90-100	85-100	50-70	15-20	NP-5
	17-27	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	65-80	40-60	15-20	NP-5
	27-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
Kuslinad, very wet	0-8	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	8-17	Silt loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	0	100	90-100	85-100	50-70	15-20	NP-5
	17-27	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	65-80	40-60	15-20	NP-5
	27-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
Kusdry------	0-6	Fine sandy loam.	SM	A-4	0	0	95-100	90-100	75-85	35-50	10-15	NP-5
	6-43	Stratified sand to silt.	SM	A-4	0	0	90-100	85-100	75-85	35-50	10-15	NP-5
	43-60	Extremely gravelly coarse sand, very gravelly sand, very cobbly coarse sand.	GP, SP	A-1	0-5	0-35	50-65	25-50	10-25	0-5	---	---
ST31*:												
Dackey, cool	0-7	Fine sandy loam.	ML, SM	A-4	0	0	100	100	80-90	45-65	15-20	NP-5
	7-27	Stratified sand to silt.	SM	A-2, A-4	0	0	100	100	80-90	30-50	10-15	NP-5
	27-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, GP-GM, SP-SM	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	NP
Hogan, cool-	0-9	Fine sandy loam.	ML	A-4	0	0	100	100	75-95	50-70	15-20	NP-5
	9-25	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	70-85	45-60	10-15	NP-5
	25-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---

* See footnote at end of table.

Table 11. Engineering Index Properties (Continued)

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 10 inches	Frag- ments 3-10 inches	Percentage passing sieve number-				Liquid limit	Plas- ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
ST41*:												
Maclaren----	0-4	Silt loam--------	ML, SM	A-4	0	0	100	95-100	75-90	45-65	15-20	NP-5
	4-18	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	70-85	45-60	10-15	NP-5
	18-60	Very gravelly sand, extremely gravelly sand, extremely cobbly coarse sand.	GP-GM, SP-SM	A-1	0-10	10-50	35-60	25-45	15-35	5-10	---	NP
Sinona------	0-3	Loam-------------	ML	A-4	0	0	100	95-100	75-90	50-65	15-20	NP-5
	3-9	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	70-85	45-60	15-20	NP-5
	9-60	Very gravelly sand, extremely gravelly sand, extremely cobbly sand.	GP-GM, SP-SM	A-1	0-10	10-50	35-60	25-45	15-35	5-10	---	NP
ST411*:												
Maclaren----	0-4	Silt loam--------	ML, SM	A-4	0	0	100	95-100	75-90	45-65	15-20	NP-5
	4-18	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	70-85	45-60	10-15	NP-5
	18-60	Very gravelly sand, extremely gravelly sand, extremely cobbly coarse sand.	GP-GM, SP-SM	A-1	0-10	10-50	35-60	25-45	15-35	5-10	---	NP
Kuslinad, very wet	0-8	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	8-17	Silt loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	0	100	90-100	85-100	50-70	15-20	NP-5
	17-27	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	65-80	40-60	15-20	NP-5
	27-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
Kuslinad----	0-8	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	8-17	Silt loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	0	100	90-100	85-100	50-70	15-20	NP-5
	17-27	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	65-80	40-60	15-20	NP-5
	27-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
ST441*:												
Kuslinad----	0-8	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	8-17	Silt loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	0	100	90-100	85-100	50-70	15-20	NP-5
	17-27	Stratified silt to sand.	ML, SM	A-4	0	0-5	95-100	90-100	65-80	40-60	15-20	NP-5
	27-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---

* See footnote at end of table.

Table 11. Engineering Index Properties (Continued)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number-: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
ST441*: (cont'd)												
Dackey, cool	0-7	Fine sandy loam.	ML, SM	A-4	0	0	100	100	80-90	45-65	15-20	NP-5
	7-27	Stratified sand to silt.	SM	A-2, A-4	0	0	100	100	80-90	30-50	10-15	NP-5
	27-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, GP-GM, SP-SM	A-1	0-5	15-25	50-65	25-50	10-25	0-5	---	NP
TS1*:												
Cryaquepts--	0-9	Loam-------------	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15
	9-60	Loam, clay loam, cobbly silty clay loam.	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15
TS3:												
Mankomen peat	0-15	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	15-20	Loamy fine sand, loamy sand.	SM	A-2	0	0	100	100	60-80	25-45	---	NP
	20-42	Loamy sand, sand.	SM	A-2, A-4	0	0	100	90-100	65-85	20-40	---	NP
	42-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
TS12*:												
Chelina-----	0-1	Loam-------------	CL	A-6	0	0-5	75-100	65-95	60-85	55-75	30-35	10-15
	1-60	Gravelly clay loam, loam, sandy clay loam.	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15
Mendna------	0-9	Peat-------------	PT	A-8	0	0-10	---	---	---	---	---	---
	9-20	Clay loam, gravelly loam, silty clay loam.	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15
	20-48	Clay loam, gravelly loam, silty clay loam.	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15
	48-60	Ice or frozen soil.	---	---	---	---	---	---	---	---	---	---
TS14*:												
Cryaquepts--	0-9	Loam-------------	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15
	9-60	Loam, clay loam, cobbly silty clay loam.	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15
Cryaquepts, very wet	0-9	Loam-------------	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15
	9-60	Loam, clay loam, cobbly silty clay loam.	CL	A-6	0	0-25	75-100	65-95	60-85	55-75	30-35	10-15

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 12. Physical and Chemical Properties of Soils

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated.)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
AF1*:											
Pippod----------	0-1	5-10	0.95-1.15	0.6-2.0	0.17-0.20	4.5-6.0	Low----------	0.37	5	1	2-4
	1-8	0-5	1.25-1.35	0.6-2.0	0.14-0.16	5.1-6.0	Low----------	0.24			
	8-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.6-6.5	Low----------	0.02			
Clarena---------	0-3	0-10	0.95-1.15	0.6-2.0	0.17-0.20	4.5-5.5	Low----------	0.37	2	1	2-8
	3-18	0-10	1.10-1.20	0.6-2.0	0.13-0.16	5.1-6.5	Low----------	0.32			
	18-60	0-5	1.40-1.50	6.0-20	0.03-0.06	6.1-7.3	Low----------	0.10			
AL1*:											
Cobblank, cool--	0-1	5-10	0.90-1.15	0.6-2.0	0.17-0.20	4.5-5.5	Low----------	0.37	1	1	3-6
	1-10	5-10	1.40-1.60	0.6-2.0	0.13-0.16	5.1-6.0	Low----------	0.32			
	10-18	5-15	1.50-1.60	0.6-2.0	0.12-0.14	5.1-6.5	Low----------	0.17			
	18-22	---	---	---	---	---	-------------	----			
Rock outcrop.											
AL2*:											
Cobblank--------	0-1	5-10	0.90-1.15	0.6-2.0	0.17-0.20	4.5-5.5	Low----------	0.37	1	1	3-6
	1-10	5-10	1.40-1.60	0.6-2.0	0.13-0.16	5.1-6.0	Low----------	0.32			
	10-18	5-15	1.50-1.60	0.6-2.0	0.12-0.14	5.1-6.5	Low----------	0.17			
	18-22	---	---	---	---	---	-------------	----			
Telay-----------	0-2	5-10	0.95-1.15	0.6-2.0	0.17-0.20	4.5-5.5	Low----------	0.37	5	1	3-6
	2-11	5-10	1.30-1.40	0.6-2.0	0.12-0.15	5.1-6.0	Low----------	0.28			
	11-60	0-10	1.50-1.70	0.6-2.0	0.09-0.12	5.6-6.5	Low----------	0.17			
AT1*:											
Chistna---------	0-1	0-10	0.95-1.15	0.6-2.0	0.21-0.23	5.1-6.0	Low----------	0.37	5	1	3-6
	1-4	0-5	1.25-1.35	2.0-6.0	0.14-0.16	5.1-6.0	Low----------	0.24			
	4-60	0-5	1.40-1.55	6.0-20	0.06-0.08	5.6-6.5	Low----------	0.10			
Pippod----------	0-1	5-10	0.95-1.15	0.6-2.0	0.17-0.20	4.5-6.0	Low----------	0.37	5	1	2-4
	1-8	0-5	1.25-1.35	0.6-2.0	0.14-0.16	5.1-6.0	Low----------	0.24			
	8-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.6-6.5	Low----------	0.02			
BR1:											
Cobblank--------	0-1	5-10	0.90-1.15	0.6-2.0	0.17-0.20	4.5-5.5	Low----------	0.37	1	1	3-6
	1-10	5-10	1.40-1.60	0.6-2.0	0.13-0.16	5.1-6.0	Low----------	0.32			
	10-18	5-15	1.50-1.60	0.6-2.0	0.12-0.14	5.1-6.5	Low----------	0.17			
	18-22	---	---	---	---	---	-------------	----			
ESC1*:											
Cryorthents-----	0-1	0-25	1.10-1.50	0.6-2.0	0.14-0.20	5.6-6.5	-------------	0.32	5	1	2-8
	1-60	0-60	---	0.06-20	0.06-0.28	6.1-8.4	-------------	----			
Cryochrepts-----	0-1	0-25	1.10-1.50	0.6-2.0	0.14-0.20	5.6-6.5	-------------	0.32	5	1	2-8
	1-60	0-50	1.20-1.80	0.06-20	0.05-0.28	6.6-8.4	-------------	----			

* See footnote at end of table.

Table 12. Physical and Chemical Properties of Soils (Continued)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
FP1:											
Tangoe sandy loam, frequently flooded	0-1	0-10	0.90-1.00	0.6-2.0	0.16-0.18	6.1-7.3	Low----------	0.32	5	3	0-2
	1-8	0-10	0.90-1.00	0.6-2.0	0.10-0.15	6.1-7.3	Low----------	0.24			
	8-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.1-7.8	Low----------	0.02			
FP2*:											
Dackey, cool----	0-7	0-10	1.10-1.30	0.6-2.0	0.14-0.18	6.1-7.8	Low----------	0.32	2	2	2-5
	7-27	0-10	1.10-1.30	0.6-2.0	0.10-0.15	6.1-7.8	Low----------	0.24			
	27-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.6-8.4	Low----------	0.10			
Swedna----------	0-1	0-10	1.10-1.25	0.6-2.0	0.14-0.18	6.1-7.8	Low----------	0.32	2	3	2-5
	1-31	0-10	1.10-1.25	0.6-2.0	0.10-0.15	6.1-7.8	Low----------	0.24			
	31-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.1-7.8	Low----------	0.10			
Swedna, very poorly drained	0-1	0-10	1.10-1.25	0.6-2.0	0.14-0.18	6.1-7.8	Low----------	0.32	2	3	2-5
	1-31	0-10	1.10-1.25	0.6-2.0	0.10-0.15	6.1-7.8	Low----------	0.24			
	31-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.1-7.8	Low----------	0.10			
FP3*:											
Dackey----------	0-7	0-10	1.10-1.30	0.6-2.0	0.14-0.18	6.1-7.8	Low----------	0.32	2	2	2-5
	7-27	0-10	1.10-1.30	0.6-2.0	0.10-0.15	6.1-7.8	Low----------	0.24			
	27-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.6-8.4	Low----------	0.10			
Klute, moderately wet	0-3	0-10	1.10-1.25	0.6-2.0	0.13-0.16	5.6-6.5	Low----------	0.32	2	3	3-6
	3-25	0-10	1.10-1.25	0.6-2.0	0.13-0.16	5.6-6.5	Low----------	0.32			
	25-60	0-5	1.40-1.50	6.0-20	0.03-0.06	6.6-8.4	Low----------	0.10			
FP4*:											
Dackey----------	0-7	0-10	1.10-1.30	0.6-2.0	0.14-0.18	6.1-7.8	Low----------	0.32	2	2	2-5
	7-27	0-10	1.10-1.30	0.6-2.0	0.10-0.15	6.1-7.8	Low----------	0.24			
	27-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.6-8.4	Low----------	0.10			
Swedna, very poorly drained	0-1	0-10	1.10-1.25	0.6-2.0	0.14-0.18	6.1-7.8	Low----------	0.32	2	3	2-5
	1-31	0-10	1.10-1.25	0.6-2.0	0.10-0.15	6.1-7.8	Low----------	0.24			
	31-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.1-7.8	Low----------	0.10			
FP6*:											
Aquatna, frequently flooded	0-6	0-10	1.10-1.25	0.6-2.0	0.14-0.18	6.1-7.8	Low----------	0.32	5	3	2-5
	6-60	0-10	1.10-1.25	0.6-2.0	0.10-0.15	6.6-7.8	Low----------	0.24			
Hogan, cool-----	0-9	0-10	1.10-1.25	0.6-2.0	0.13-0.16	5.6-6.5	Low----------	0.32	2	3	3-6
	9-25	0-10	1.10-1.20	0.6-2.0	0.13-0.16	6.1-7.8	Low----------	0.32			
	25-60	---	---	---	---	---	-------------	----			
FP12*:											
Tangoe, wet, occasionally flooded	0-7	0-5	1.50-1.60	6.0-20	0.02-0.04	6.1-7.8	Low----------	0.02	5	8	0-2
	7-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.1-7.8	Low----------	0.02			
Tangoe, wet, frequently flooded	0-7	0-5	1.50-1.60	6.0-20	0.02-0.04	6.1-7.8	Low----------	0.02	5	8	0-2
	7-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.1-7.8	Low----------	0.02			
FP13*:											
Swedna, high elevation	0-1	0-10	1.10-1.25	0.6-2.0	0.14-0.18	6.1-7.8	Low----------	0.32	2	3	2-5
	1-31	0-10	1.10-1.25	0.6-2.0	0.10-0.15	6.1-7.8	Low----------	0.24			
	31-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.1-7.8	Low----------	0.10			

* See footnote at end of table.

Table 12. Physical and Chemical Properties of Soils (Continued)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
FP13*: (cont'd)											
Hisna-----------	0-12	0-3	0.05-0.15	2.0-6.0	0.32-0.35	6.6-7.8	Low----------	0.05	1	8	65-85
	12-21	0-10	1.10-1.25	0.6-2.0	0.10-0.15	6.6-8.4	Low----------	0.24			
	21-60	0-5	1.50-1.60	6.0-20	0.02-0.04	7.4-8.4	Low----------	0.10			
FP21*:											
Swedna, high elevation	0-1	0-10	1.10-1.25	0.6-2.0	0.14-0.18	6.1-7.8	Low----------	0.32	2	3	2-5
	1-31	0-10	1.10-1.25	0.6-2.0	0.10-0.15	6.1-7.8	Low----------	0.24			
	31-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.1-7.8	Low----------	0.10			
Swedna, very poorly drained	0-1	0-10	1.10-1.25	0.6-2.0	0.14-0.18	6.1-7.8	Low----------	0.32	2	3	2-5
	1-31	0-10	1.10-1.25	0.6-2.0	0.10-0.15	6.1-7.8	Low----------	0.24			
	31-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.1-7.8	Low----------	0.10			
FP22*:											
Dackey, cool----	0-7	0-10	1.10-1.30	0.6-2.0	0.14-0.18	6.1-7.8	Low----------	0.32	2	2	2-5
	7-27	0-10	1.10-1.30	0.6-2.0	0.10-0.15	6.1-7.8	Low----------	0.24			
	27-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.6-8.4	Low----------	0.10			
Swedna, high elevation	0-1	0-10	1.10-1.25	0.6-2.0	0.14-0.18	6.1-7.8	Low----------	0.32	2	3	2-5
	1-31	0-10	1.10-1.25	0.6-2.0	0.10-0.15	6.1-7.8	Low----------	0.24			
	31-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.1-7.8	Low----------	0.10			
Kluna-----------	0-3	0-10	1.10-1.30	0.6-2.0	0.13-0.16	5.6-7.8	Low----------	0.37	3	3	3-6
	3-45	0-10	1.10-1.30	0.6-2.0	0.13-0.16	6.6-8.4	Low----------	0.37			
	45-60	0-5	1.50-1.60	6.0-20	0.03-0.06	6.6-8.4	Low----------	0.10			
FP23*:											
Hogan, cool-----	0-9	0-10	1.10-1.25	0.6-2.0	0.13-0.16	5.6-6.5	Low----------	0.32	2	3	3-6
	9-25	0-10	1.10-1.20	0.6-2.0	0.13-0.16	6.1-7.8	Low----------	0.32			
	25-60	---	---	---	---	---	-------------	----			
Sankluna--------	0-11	0-10	1.10-1.20	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.37	3	3	2-4
	11-43	0-10	1.20-1.40	2.0-6.0	0.08-0.14	6.1-7.8	Low----------	0.20			
	43-60	0-5	1.20-1.40	2.0-6.0	0.11-0.14	6.1-7.8	Low----------	0.24			
FP31*:											
Kluna, deep-----	0-3	0-10	1.10-1.20	0.6-2.0	0.14-0.18	5.6-7.3	Low----------	0.32	5	3	3-6
	3-60	0-10	1.10-1.30	0.6-2.0	0.13-0.16	6.6-8.4	Low----------	0.37			
Hogan-----------	0-9	0-10	1.10-1.25	0.6-2.0	0.13-0.16	5.6-6.5	Low----------	0.32	2	3	3-6
	9-25	0-10	1.10-1.20	0.6-2.0	0.13-0.16	6.1-7.8	Low----------	0.32			
	25-60	---	---	---	---	---	-------------	----			
Kluna, frequently flooded	0-2	0-10	1.10-1.20	0.6-2.0	0.13-0.16	6.6-7.8	Low----------	0.37	3	3	3-6
	2-60	0-10	1.10-1.20	0.6-2.0	0.13-0.16	7.4-8.4	Low----------	0.37			
FP32*:											
Dackey----------	0-7	0-10	1.10-1.30	0.6-2.0	0.14-0.18	6.1-7.8	Low----------	0.32	2	2	2-5
	7-27	0-10	1.10-1.30	0.6-2.0	0.10-0.15	6.1-7.8	Low----------	0.24			
	27-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.6-8.4	Low----------	0.10			
Hogan-----------	0-9	0-10	1.10-1.25	0.6-2.0	0.13-0.16	5.6-6.5	Low----------	0.32	2	3	3-6
	9-25	0-10	1.10-1.20	0.6-2.0	0.13-0.16	6.1-7.8	Low----------	0.32			
	25-60	---	---	---	---	---	-------------	----			

* See footnote at end of table.

Table 12. Physical and Chemical Properties of Soils (Continued)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
FP32*: (cont'd)											
Klute, moderately wet	0-3	0-10	1.10-1.25	0.6-2.0	0.13-0.16	5.6-6.5	Low----------	0.32	2	3	3-6
	3-25	0-10	1.10-1.25	0.6-2.0	0.13-0.16	5.6-6.5	Low----------	0.32			
	25-60	0-5	1.40-1.50	6.0-20	0.03-0.06	6.6-8.4	Low----------	0.10			
GO1*:											
Pippod, high elevation	0-1	5-10	0.95-1.15	0.6-2.0	0.17-0.20	4.5-6.0	Low----------	0.37	5	1	2-4
	1-8	0-5	1.25-1.35	0.6-2.0	0.14-0.16	5.1-6.0	Low----------	0.24			
	8-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.6-6.5	Low----------	0.02			
Chistna, high elevation	0-1	0-10	0.95-1.15	0.6-2.0	0.21-0.23	5.1-6.0	Low----------	0.37	5	1	3-6
	1-4	0-5	1.25-1.35	2.0-6.0	0.14-0.16	5.1-6.0	Low----------	0.24			
	4-60	0-5	1.40-1.55	6.0-20	0.06-0.08	5.6-6.5	Low----------	0.10			
LC1:											
Klasi peat------	0-9	---	0.05-0.10	2.0-6.0	0.32-0.35	5.1-6.5	Low----------	0.05	2	8	65-90
	9-11	30-40	1.30-1.50	0.6-2.0	0.18-0.22	6.1-7.8	Moderate-----	0.17			
	11-32	35-60	1.40-1.60	0.6-2.0	0.06-0.12	6.1-7.8	Moderate-----	0.17			
	32-60	---	---	---	---	---	-------------	----			
LC2:											
Gadona silty clay	0-11	25-35	1.35-1.50	0.6-2.0	0.12-0.16	5.6-7.3	Moderate-----	0.17	5	4	0-2
	11-60	35-55	1.35-1.50	0.6-2.0	0.06-0.12	6.1-8.4	Moderate-----	0.17			
LC5*:											
Klasi-----------	0-9	---	0.05-0.10	2.0-6.0	0.32-0.35	5.1-6.5	Low----------	0.05	2	8	65-90
	9-11	30-40	1.30-1.50	0.6-2.0	0.18-0.22	6.1-7.8	Moderate-----	0.17			
	11-32	35-60	1.40-1.60	0.6-2.0	0.06-0.12	6.1-7.8	Moderate-----	0.17			
	32-60	---	---	---	---	---	-------------	----			
Klasi, very wet-	0-9	---	0.05-0.10	2.0-6.0	0.32-0.35	5.1-6.5	Low----------	0.05	2	8	65-90
	9-11	30-40	1.30-1.50	0.6-2.0	0.18-0.22	6.1-7.8	Moderate-----	0.17			
	11-32	35-60	1.40-1.60	0.6-2.0	0.06-0.12	6.1-7.8	Moderate-----	0.17			
	32-60	---	---	---	---	---	-------------	----			
LC6*:											
Swillna, thin surface	0-6	30-40	1.30-1.50	0.2-0.6	0.18-0.22	6.1-7.8	Moderate-----	0.17	3	4	1-3
	6-38	30-40	1.30-1.50	0.2-0.6	0.18-0.22	6.1-7.8	Moderate-----	0.17			
Swillna---------	0-9	---	0.05-0.10	2.0-6.0	0.32-0.35	5.6-6.5	Low----------	0.05	1	8	65-90
	9-18	30-40	1.30-1.50	0.2-0.6	0.18-0.22	6.1-7.8	Moderate-----	0.17			
	18-21	---	0.05-0.10	0.6-2.0	0.32-0.35	6.1-7.8	Low----------	0.05			
	21-60	---	---	---	---	---	-------------	----			
LL1*:											
Mendna----------	0-9	0-3	0.05-0.15	2.0-6.0	0.32-0.35	5.1-6.0	Low----------	0.05	3	8	65-85
	9-20	20-35	1.20-1.40	0.6-2.0	0.14-0.16	5.6-7.8	Low----------	0.32			
	20-48	20-35	1.30-1.50	0.6-2.0	0.14-0.16	6.1-7.8	Moderate-----	0.32			
	48-60	---	---	---	---	---	-------------	----			
Chelina---------	0-1	20-35	1.30-1.50	0.6-2.0	0.14-0.16	5.6-7.3	Moderate-----	0.32	5	6	1-3
	1-60	20-35	1.30-1.50	0.6-2.0	0.14-0.16	6.6-8.4	Moderate-----	0.32			

* See footnote at end of table.

Table 12. Physical and Chemical Properties of Soils (Continued)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
LL2*:											
Mendna----------	0-9	0-3	0.05-0.15	2.0-6.0	0.32-0.35	5.1-6.0	Low----------	0.05	3	8	65-85
	9-20	20-35	1.20-1.40	0.6-2.0	0.14-0.16	5.6-7.8	Low----------	0.32			
	20-48	20-35	1.30-1.50	0.6-2.0	0.14-0.16	6.1-7.8	Moderate-----	0.32			
	48-60	---	---	---	---	---	-------------	----			
Ewan------------	0-4	20-35	1.20-1.40	0.6-2.0	0.15-0.18	5.6-7.3	Moderate-----	0.32	5	6	2-8
	4-60	20-35	1.30-1.50	0.6-2.0	0.14-0.16	6.1-7.3	Moderate-----	0.32			
LL3:											
Gadona silty clay	0-11	25-35	1.35-1.50	0.6-2.0	0.12-0.16	5.6-7.3	Moderate-----	0.17	5	4	0-2
	11-60	35-55	1.35-1.50	0.6-2.0	0.06-0.12	6.1-8.4	Moderate-----	0.17			
LL12, LL13:											
Chelina loam----	0-1	20-35	1.30-1.50	0.6-2.0	0.14-0.16	5.6-7.3	Moderate-----	0.32	5	6	1-3
	1-60	20-35	1.30-1.50	0.6-2.0	0.14-0.16	6.6-8.4	Moderate-----	0.32			
LL41*, LL411*:											
Pergelic Cryohemists	0-27	0-3	0.05-0.20	2.0-6.0	0.30-0.35	4.5-7.3	Low----------	0.05	2	8	80-99
	27-60	---	---	---	---	---	-------------	----			
Mendna, very wet	0-9	0-3	0.05-0.15	2.0-6.0	0.32-0.35	5.1-6.0	Low----------	0.05	3	8	65-85
	9-20	20-35	1.20-1.40	0.6-2.0	0.14-0.16	5.6-7.8	Low----------	0.32			
	20-48	20-35	1.30-1.50	0.6-2.0	0.14-0.16	6.1-7.8	Moderate-----	0.32			
	48-60	---	---	---	---	---	-------------	----			
Cryofibrists----	0-29	0-3	0.05-0.20	2.0-6.0	0.30-0.35	4.5-7.3	Low----------	0.05	5	8	80-99
	29-60	---	---	0.6-2.0	---	6.1-7.8	Low----------	----			
MK1:											
Hufman peat-----	0-26	0-3	0.10-0.15	2.0-6.0	0.32-0.35	5.1-6.5	Low----------	0.05	2	8	70-90
	26-60	0-10	1.10-1.20	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.24			
MK2*:											
Pergelic Cryohemists	0-27	0-3	0.05-0.20	2.0-6.0	0.30-0.35	4.5-7.3	Low----------	0.05	2	8	80-99
	27-60	---	---	---	---	---	-------------	----			
Cryofibrists----	0-29	0-3	0.05-0.20	2.0-6.0	0.30-0.35	4.5-7.3	Low----------	0.05	5	8	80-99
	29-60	---	---	0.6-2.0	---	6.1-7.8	Low----------	----			
SA1:											
Nickolna silt loam	0-8	0-10	0.95-1.15	0.6-2.0	0.17-0.20	5.1-6.0	Low----------	0.37	5	1	6-10
	8-60	20-35	1.30-1.50	0.6-2.0	0.14-0.16	5.6-7.3	Moderate-----	0.32			
SA3*:											
Goodview--------	0-2	0-10	0.95-1.15	0.6-2.0	0.26-0.28	5.1-6.0	Low----------	0.37	1	2	6-10
	2-7	0-5	1.10-1.20	0.6-2.0	0.19-0.21	5.1-6.5	Low----------	0.24			
	7-60	---	---	---	---	---	-------------	----			
Rock outcrop.											
ST1*:											
Klute-----------	0-5	0-10	1.10-1.25	0.6-2.0	0.13-0.16	5.6-6.5	Low----------	0.32	2	3	3-6
	5-33	0-10	1.10-1.25	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.32			
	33-60	0-5	1.50-1.60	6.0-20	0.03-0.06	6.6-8.4	Low----------	0.10			

* See footnote at end of table.

Table 12. Physical and Chemical Properties of Soils (Continued)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
ST1*: (cont'd)											
Kluna-----------	0-3	0-10	1.10-1.30	0.6-2.0	0.13-0.16	5.6-7.8	Low----------	0.37	3	3	3-6
	3-45	0-10	1.10-1.30	0.6-2.0	0.13-0.16	6.6-8.4	Low----------	0.37			
	45-60	0-5	1.50-1.60	6.0-20	0.03-0.06	6.6-8.4	Low----------	0.10			
ST2*:											
Kuslinad--------	0-8	0-3	0.05-0.15	2.0-6.0	0.32-0.35	5.1-6.0	Low----------	0.05	2	8	65-85
	8-17	5-10	1.10-1.25	0.6-2.0	0.16-0.18	5.6-6.5	Low----------	0.32			
	17-27	0-10	1.25-1.45	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.24			
	27-60	---	---	---	---	---	-------------	----			
Pergelic Cryohemists, dry	0-27	0-3	0.05-0.20	2.0-6.0	0.30-0.35	4.5-7.3	Low----------	0.05	2	8	80-99
	27-60	---	---	---	---	---	-------------	----			
Hufman----------	0-26	0-3	0.10-0.15	2.0-6.0	0.32-0.35	5.1-6.5	Low----------	0.05	2	8	70-90
	26-60	0-10	1.10-1.20	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.24			
ST3*:											
Dackey----------	0-7	0-10	1.10-1.30	0.6-2.0	0.14-0.18	6.1-7.8	Low----------	0.32	2	2	2-5
	7-27	0-10	1.10-1.30	0.6-2.0	0.10-0.15	6.1-7.8	Low----------	0.24			
	27-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.6-8.4	Low----------	0.10			
Hogan-----------	0-9	0-10	1.10-1.25	0.6-2.0	0.13-0.16	5.6-6.5	Low----------	0.32	2	3	3-6
	9-25	0-10	1.10-1.20	0.6-2.0	0.13-0.16	6.1-7.8	Low----------	0.32			
	25-60	---	---	---	---	---	-------------	----			
ST4:											
Hogan fine sandy loam	0-9	0-10	1.10-1.25	0.6-2.0	0.13-0.16	5.6-6.5	Low----------	0.32	2	3	3-6
	9-25	0-10	1.10-1.20	0.6-2.0	0.13-0.16	6.1-7.8	Low----------	0.32			
	25-60	---	---	---	---	---	-------------	----			
ST5:											
Haggard peat----	0-24	---	0.05-0.15	2.0-6.0	0.32-0.35	5.1-7.3	Low----------	0.05	2	8	65-85
	24-60	---	---	---	---	---	-------------	----			
ST11*:											
Klute-----------	0-5	0-10	1.10-1.25	0.6-2.0	0.13-0.16	5.6-6.5	Low----------	0.32	2	3	3-6
	5-33	0-10	1.10-1.25	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.32			
	33-60	0-5	1.50-1.60	6.0-20	0.03-0.06	6.6-8.4	Low----------	0.10			
Tangoe, occasionally flooded	0-3	0-10	0.90-1.00	0.6-2.0	0.22-0.26	6.1-7.3	Low----------	0.32	5	3	2-4
	3-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.1-7.8	Low----------	0.02			
ST12:											
Ogtna mucky fine sandy loam	0-4	0-10	1.00-1.15	0.6-2.0	0.30-0.34	5.1-6.0	Low----------	0.32	1	6	8-12
	4-13	0-10	1.10-1.20	0.6-2.0	0.26-0.30	5.1-6.0	Low----------	0.32			
	13-60	0-5	1.40-1.50	6.0-20	0.03-0.06	6.6-7.3	Low----------	0.10			
ST13*:											
Tangoe, occasionally flooded	0-1	0-10	0.90-1.00	0.6-2.0	0.16-0.18	6.1-7.3	Low----------	0.32	5	3	0-2
	1-8	0-10	0.90-1.00	0.6-2.0	0.10-0.15	6.1-7.3	Low----------	0.24			
	8-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.1-7.8	Low----------	0.02			
Klute, occasionally flooded	0-5	0-10	1.10-1.25	0.6-2.0	0.13-0.16	5.6-6.5	Low----------	0.32	2	3	3-6
	5-33	0-10	1.10-1.25	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.32			
	33-60	0-5	1.50-1.60	6.0-20	0.03-0.06	6.6-8.4	Low----------	0.10			

* See footnote at end of table.

Table 12. Physical and Chemical Properties of Soils (continued)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
ST21:											
Kuslinad peat---	0-8	0-3	0.05-0.15	2.0-6.0	0.32-0.35	5.1-6.0	Low----------	0.05	2	8	65-85
	8-17	5-10	1.10-1.25	0.6-2.0	0.16-0.18	5.6-6.5	Low----------	0.32			
	17-27	0-10	1.25-1.45	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.24			
	27-60	---	---	---	---	---	-------------	----			
ST22*:											
Kuslinad--------	0-8	0-3	0.05-0.15	2.0-6.0	0.32-0.35	5.1-6.0	Low----------	0.05	2	8	65-85
	8-17	5-10	1.10-1.25	0.6-2.0	0.16-0.18	5.6-6.5	Low----------	0.32			
	17-27	0-10	1.25-1.45	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.24			
	27-60	---	---	---	---	---	-------------	----			
Ganhona---------	0-2	0-10	0.95-1.15	0.6-2.0	0.17-0.20	5.1-6.0	Low----------	0.37	5	1	2-8
	2-52	0-10	1.10-1.20	0.6-2.0	0.13-0.16	5.6-7.3	Low----------	0.32			
	52-60	0-5	1.20-1.40	2.0-6.0	0.08-0.14	5.6-7.3	Low----------	0.20			
ST24*:											
Kuslinad--------	0-8	0-3	0.05-0.15	2.0-6.0	0.32-0.35	5.1-6.0	Low----------	0.05	2	8	65-85
	8-17	5-10	1.10-1.25	0.6-2.0	0.16-0.18	5.6-6.5	Low----------	0.32			
	17-27	0-10	1.25-1.45	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.24			
	27-60	---	---	---	---	---	-------------	----			
Kuslinad, very wet	0-8	0-3	0.05-0.15	2.0-6.0	0.32-0.35	5.1-6.0	Low----------	0.05	2	8	65-85
	8-17	5-10	1.10-1.25	0.6-2.0	0.16-0.18	5.6-6.5	Low----------	0.32			
	17-27	0-10	1.25-1.45	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.24			
	27-60	---	---	---	---	---	-------------	----			
ST24B*:											
Kuslinad--------	0-8	0-3	0.05-0.15	2.0-6.0	0.32-0.35	5.1-6.0	Low----------	0.05	2	8	65-85
	8-17	5-10	1.10-1.25	0.6-2.0	0.16-0.18	5.6-6.5	Low----------	0.32			
	17-27	0-10	1.25-1.45	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.24			
	27-60	---	---	---	---	---	-------------	----			
Kuslinad, very wet	0-8	0-3	0.05-0.15	2.0-6.0	0.32-0.35	5.1-6.0	Low----------	0.05	2	8	65-85
	8-17	5-10	1.10-1.25	0.6-2.0	0.16-0.18	5.6-6.5	Low----------	0.32			
	17-27	0-10	1.25-1.45	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.24			
	27-60	---	---	---	---	---	-------------	----			
Kusdry----------	0-6	0-10	0.90-1.00	0.6-2.0	0.16-0.18	5.6-6.5	Low----------	0.32	3	3	0-2
	6-43	0-10	1.10-1.25	0.6-2.0	0.10-0.15	6.1-7.3	Low----------	0.24			
	43-60	0-5	1.50-1.60	>20	0.02-0.04	6.6-7.8	Low----------	0.02			
ST31*:											
Dackey, cool----	0-7	0-10	1.10-1.30	0.6-2.0	0.14-0.18	6.1-7.8	Low----------	0.32	2	2	2-5
	7-27	0-10	1.10-1.30	0.6-2.0	0.10-0.15	6.1-7.8	Low----------	0.24			
	27-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.6-8.4	Low----------	0.10			
Hogan, cool-----	0-9	0-10	1.10-1.25	0.6-2.0	0.13-0.16	5.6-6.5	Low----------	0.32	2	3	3-6
	9-25	0-10	1.10-1.20	0.6-2.0	0.13-0.16	6.1-7.8	Low----------	0.32			
	25-60	---	---	---	---	---	-------------	----			
ST41*:											
Maclaren--------	0-4	0-10	1.10-1.20	0.6-2.0	0.13-0.16	5.1-6.0	Low----------	0.32	1	3	3-6
	4-18	0-10	1.10-1.20	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.32			
	18-60	0-5	1.40-1.50	6.0-20	0.03-0.06	6.1-7.8	Low----------	0.10			

* See footnote at end of table.

Table 12. Physical and Chemical Properties of Soils (Continued)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
ST41*: (cont'd)											
Sinona----------	0-3	0-10	1.10-1.20	0.6-2.0	0.13-0.16	5.1-6.0	Low----------	0.32	5	3	3-6
	3-9	0-10	1.10-1.20	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.32			
	9-60	0-5	1.40-1.50	6.0-20	0.03-0.06	6.1-7.3	Low----------	0.10			
ST411*:											
Maclaren--------	0-4	0-10	1.10-1.20	0.6-2.0	0.13-0.16	5.1-6.0	Low----------	0.32	1	3	3-6
	4-18	0-10	1.10-1.20	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.32			
	18-60	0-5	1.40-1.50	6.0-20	0.03-0.06	6.1-7.8	Low----------	0.10			
Kuslinad, very wet	0-8	0-3	0.05-0.15	2.0-6.0	0.32-0.35	5.1-6.0	Low----------	0.05	2	8	65-85
	8-17	5-10	1.10-1.25	0.6-2.0	0.16-0.18	5.6-6.5	Low----------	0.32			
	17-27	0-10	1.25-1.45	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.24			
	27-60	---	---	---	---	---	-------------	----			
Kuslinad--------	0-8	0-3	0.05-0.15	2.0-6.0	0.32-0.35	5.1-6.0	Low----------	0.05	2	8	65-85
	8-17	5-10	1.10-1.25	0.6-2.0	0.16-0.18	5.6-6.5	Low----------	0.32			
	17-27	0-10	1.25-1.45	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.24			
	27-60	---	---	---	---	---	-------------	----			
ST441*:											
Kuslinad--------	0-8	0-3	0.05-0.15	2.0-6.0	0.32-0.35	5.1-6.0	Low----------	0.05	2	8	65-85
	8-17	5-10	1.10-1.25	0.6-2.0	0.16-0.18	5.6-6.5	Low----------	0.32			
	17-27	0-10	1.25-1.45	0.6-2.0	0.13-0.16	6.1-7.3	Low----------	0.24			
	27-60	---	---	---	---	---	-------------	----			
Dackey, cool----	0-7	0-10	1.10-1.30	0.6-2.0	0.14-0.18	6.1-7.8	Low----------	0.32	2	2	2-5
	7-27	0-10	1.10-1.30	0.6-2.0	0.10-0.15	6.1-7.8	Low----------	0.24			
	27-60	0-5	1.50-1.60	6.0-20	0.02-0.04	6.6-8.4	Low----------	0.10			
TS1*:											
Cryaquepts------	0-9	10-35	1.20-1.50	0.6-2.0	0.16-0.20	5.1-7.8	Low----------	0.32	5	4	2-6
	9-60	10-35	1.30-1.60	0.6-2.0	0.14-0.16	5.6-7.8	Moderate-----	0.32			
TS3:											
Mankomen peat---	0-15	0-3	0.05-0.15	2.0-6.0	0.32-0.35	5.1-6.5	Low----------	0.05	1	8	65-85
	15-20	0-5	1.30-1.50	6.0-20	0.08-0.12	5.6-7.3	Low----------	0.15			
	20-42	0-5	1.40-1.55	6.0-20	0.06-0.08	6.1-7.8	Low----------	0.10			
	42-60	---	---	---	---	---	-------------	----			
TS12*:											
Chelina---------	0-1	20-35	1.30-1.50	0.6-2.0	0.14-0.16	5.6-7.3	Moderate-----	0.32	5	6	1-3
	1-60	20-35	1.30-1.50	0.6-2.0	0.14-0.16	6.6-8.4	Moderate-----	0.32			
Mendna----------	0-9	0-3	0.05-0.15	2.0-6.0	0.32-0.35	5.1-6.0	Low----------	0.05	3	8	65-85
	9-20	20-35	1.20-1.40	0.6-2.0	0.14-0.16	5.6-7.8	Low----------	0.32			
	20-48	20-35	1.30-1.50	0.6-2.0	0.14-0.16	6.1-7.8	Moderate-----	0.32			
	48-60	---	---	---	---	---	-------------	----			
TS14*:											
Cryaquepts------	0-9	10-35	1.20-1.50	0.6-2.0	0.16-0.20	5.1-7.8	Low----------	0.32	5	4	2-6
	9-60	10-35	1.30-1.60	0.6-2.0	0.14-0.16	5.6-7.8	Moderate-----	0.32			
Cryaquepts, very wet	0-9	10-35	1.20-1.50	0.6-2.0	0.16-0.20	5.1-7.8	Low----------	0.32	5	4	2-6
	9-60	10-35	1.30-1.60	0.6-2.0	0.14-0.16	5.6-7.8	Moderate-----	0.32			

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 13. Physical Analyses of Selected Soils

(A dash indicates that the material was not detected. A blank indicates that a determination was not made. TR indicates a trace amount of the element.)

Soil name and sample number	Horizon	Depth	Particle-size distribution: Sand: Very coarse (2.0-1.0 mm)	Sand: Coarse (1.0-0.5 mm)	Sand: Medium (0.5-0.25 mm)	Sand: Fine (0.25-0.1 mm)	Sand: Very fine (0.1-0.05 mm)	Sand: Total (2.0-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Water content: 1/3 bar	Water content: 15 bar	Water content: Water retention	Bulk density: 1/3 bar	Bulk density: Oven-dry
		In	Pct								Pct(wt)			g/cc	
Chelina (LL12)	Oi	2-0													
S92AK-261-002	AC	0-6	0.1	0.2	0.7	7.8	6.8	15.6	57.5	26.9		12.7			
62° 46'36''N lat.	C1	6-14	TR	0.2	0.9	8.7	8.1	17.9	52.9	29.2	23.8	12.5	0.18	1.55	1.70
145° 37'22''W long.	C2	14-29	TR	TR	0.1	0.2	0.3	0.6	65.4	34.0	30.5	15.5	0.20	1.32	1.46
	C3	29-49	TR	0.2	0.3	0.3	1.0	1.8	47.5	50.7		20.0			
	C4	49-60	TR	0.1	TR	0.1	0.6	0.8	68.3	30.9		12.6			
Haggard (ST5)	Oi	0-7										146.9			
S92AK-261-007	Oe	7-12										115.6			
62°33'09''N lat.	Oe/C	12-20	0.1	0.9	2.8	22.9	22.8	49.5	43.5	7.0		19.2			
145°31'11''W long.	Oe	20-24										68.7			
	Cgf	24-49	TR	--	0.3	8.9	34.9	44.1	48.5	7.4	24.6	9.8	0.22	1.47	1.47
Hogan (ST4)	AC/Oe	0-3	0.1	0.4	0.8	12.0	26.9	40.2	52.5	7.3	60.6	25.7	0.23	0.59	0.70
S92AK-261-004	AC	3-12	0.1	0.1	0.2	3.5	28.7	32.6	57.0	10.4	21.4	9.8	0.14	1.21	1.23
62° 37'30''N lat.	Cg	12-20	0.6	1.1	3.5	24.1	29.4	58.7	35.7	5.6		5.3			
145° 40'42''W long.	C	20-25	2.9	6.3	14.5	29.4	23.6	76.7	19.5	3.8		3.8			
Klasi (LC1)	Oa	3-0										61.7			
S92AK-261-005	Cg/Oa	0-3	3.4	3.1	4.4	7.7	8.1	26.7	46.1	27.2		16.4			
62° 37'24''N lat.	Cg	3-10	1.9	2.4	4.8	9.5	10.8	29.4	39.2	31.4	22.0	16.7	0.07	1.57	1.71
135° 40'21''W long.	C	10-23	2.2	2.0	4.0	9.7	9.8	27.7	36.5	35.8		15.3			
Kluna (ST1)	Oi	2-0										101.3			
S92AK-261-001	AC	0-3	--	0.1	0.8	5.2	20.9	27.0	61.7	11.3		13.5			
62° 51'N lat.	C1	3-14	TR	0.1	7.5	57.5	20.0	85.1	10.5	4.4		4.6			
145° 40'W long.	C/Oa	14-19	TR	0.1	0.7	27.9	36.9	65.6	27.0	7.4		6.4			
	C2	19-40	0.1	0.3	1.4	29.7	32.9	64.4	29.0	6.6		4.7			
	Cg	40-45	TR	0.1	0.3	14.2	39.7	54.3	37.6	8.1		6.0			
Mankomen (TS3)	Oa	3-0										79.6			
S92AK-261-006	C	0-10	TR	0.7	22.2	64.2	9.2	96.3	3.0	0.7		1.7			
62°34'01''N lat.	Cg2	10-28	TR	0.3	26.7	60.6	8.0	95.6	3.3	1.1		2.0			
145°32'05''W long.	Cg3	28-37	0.1	0.2	22.7	58.6	10.3	91.9	5.9	2.2		4.0			
	Cg4	37-47	0.1	0.4	10.6	35.3	23.8	70.2	26.6	3.2		3.8			

Table 13. Physical Analyses of Selected Soils (Continued)

Soil name and sample number	Horizon	Depth	Particle-size distribution: Sand: Very coarse (2.0-1.0 mm)	Coarse (1.0-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very fine (0.1-0.05 mm)	Total (2.0-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Water content: 1/3 bar	15 bar	Water retention	Bulk density: 1/3 bar	Oven-dry
		In	Pct								Pct(wt)			g/cc	
Pippod (AT1)	E/A	0-1	0.3	3.0	6.7	11.8	20.0	41.8	53.6	4.6		24.1			
S92AK-261-003	Bs	1-5	0.3	0.8	2.6	6.8	14.8	25.3	69.0	5.7		13.0			
62° 43'42''N lat.	BC	5-8	2.3	1.0	1.2	6.6	20.9	32.0	63.2	4.8		4.9			
145° 33'48''W long.	2BC	8-14	54.5	24.7	7.8	3.0	1.5	91.5	5.2	3.3		3.5			
	2C	14-16	30.1	27.7	13.4	10.2	5.3	86.7	12.9	0.4		2.4			

Table 14. Chemical Analyses of Selected Soils

(A dash indicates that the material was not detected. A blank indicates that a determination was not made. TR indicates a trace amount of the element. Extractable calcium is not reported when calcium carbonate is detected in the horizon.)

Soil name and sample number	Horizon	Depth	Cation-exchange capacity: Sum of cations	Cation-exchange capacity: Ammonium acetate	pH CaCl 0.01M (1:2)	pH CaCl 0.01M (1:1)	Organic carbon	Total nitrogen	Extractable acidity	Extractable bases: Ca	Extractable bases: Mg	Extractable bases: K	Extractable bases: Na
		In	---Meq/100 g---				------Pct------		-----------Meq/100 g-----------				
Chelina (LL12)	Oi	2-0	118.2	101.4			41.29	1.587	63.4	44.6	7.6	2.3	0.3
S92AK-261-002	AC	0-6	25.6	22.1	5.4	6.1	1.97		8.0	12.7	4.3	0.3	0.3
62°46'36'' N lat.	C1	6-14	25.0	21.0	5.6	6.2	0.93		6.5	13.7	4.3	0.3	0.2
145°37'22'' W long.	C2	14-29		18.2	7.3	7.8	0.32				3.2	0.7	0.3
	C3	29-49		21.7	7.6	8.0	0.37		--		5.5	0.7	0.4
	C4	49-60		14.4	7.5	8.1	0.29		--		3.7	0.5	0.3
Haggard (ST5)	Oi	0-7	52.4	28.8			45.10	1.187	20.0	24.1	7.9	0.2	0.2
S92AK-261-007	Oe	7-12	205.2	177.0			45.04	1.846	30.2	44.0	30.1	0.2	0.7
62°33'09'' N lat.	Oe/C	12-20	49.1	35.0	5.7	6.2	13.23	0.808	15.5	26.3	6.7	0.2	0.4
145°31'11'' W long.	Oe	20-24	66.1	66.1			49.21	2.172	29.7	27.9	7.5	0.5	0.5
	Cgf	24-49		10.5	7.2	7.6	1.41		0.5		2.8	0.1	0.1
Hogan (ST4)	AC/Oe	0-3	73.5	54.7	5.5	5.6	12.28		19.5	41.2	12.2	0.3	0.3
S92AK-261-004	AC	3-12	29.0	19.2	6.3	6.7	2.25		5.9	18.2	4.5	0.1	0.3
62°37'30'' N lat.	Cg	12-20	14.1	9.6	6.7	7.1	0.66		2.2	9.2	2.2	0.2	0.3
145°40'42'' W long.	C	20-25	8.1	6.5	6.7	7.3	0.35		0.9	5.6	1.1	0.2	0.3
Klasi (LC1)	Oa	3-0	204.7	134.8			30.70	1.240	49.4	25.1	29.0	0.1	1.1
S92AK-261-005	Cg/Oa	0-3	60.2	41.4	6.0	6.3	5.25		14.4	35.2	10.2	0.1	0.3
62°37'24'' N lat.	Cg	3-10	27.2	23.4	5.6	6.4	1.24		5.8	15.0	5.8	0.3	0.3
135°40'21'' W long.	C	10-23	36.2	23.6	5.9	6.8	0.65		14.1	15.1	6.4	0.3	0.3
Kluna (ST1)	Oi	2-0	120.1	94.9			42.74	1.925	63.4	38.5	14.0	4.2	--
S92AK-261-001	AC	0-3	26.8	23.9	4.5	5.0	4.69		18.6	4.4	3.4	0.3	0.1
62°51' N lat.	C1	3-14	7.5	6.5	4.7	5.2	0.69		3.4	2.9	1.0	0.1	0.1
145°40' W long.	C/Oa	14-19	15.9	12.2	5.0	5.6	1.63		7.3	6.7	1.7	0.1	0.1
	C2	19-40	11.3	9.2	5.1	5.5	0.88		4.4	5.2	1.4	--	0.3
	Cg	40-45	13.6	10.3	5.1	5.7	0.84		5.2	6.5	1.6	0.1	0.2
Mankomen (TS3)	Oa	3-0	192.2	141.2			39.53	1.955	79.0	96.8	15.4	0.3	0.7
S92AK-261-006	C	0-10	43.9	56.0	5.5	6.2	0.24		2.1	35.5	5.7	0.4	0.2
62°34'01'' N lat.	Cg2	10-28	6.9	5.6	5.5	6.2	0.17		2.0	3.9	0.8	TR	0.2
145°32'05'' W long.	Cg3	28-37	11.3	9.3	5.9	6.6	1.01		2.0	7.6	1.3	0.1	0.3
	Cg4	37-47	11.5	8.3	5.9	6.4	0.74		3.0	6.8	1.4	0.1	0.2

Table 14. Chemical Analyses of Selected Soils (Continued)

Soil name and sample number	Hori- zon	Depth	Cation-exchange capacity		pH CaCl 0.01M		Organic carbon	Total nitro- gen	Extrac- table acidity	Extractable bases			
			Sum of cations	Ammo- nium acetate	(1:2)	(1:1)				Ca	Mg	K	Na
		In	---Meg/100 g---				------Pct------		-----------Meg/100 g-----------				
Pippod (AT1)	E/A	0-1	58.7	46.6	4.0	4.8	16.16		52.3	4.7	0.9	0.4	0.4
S92AK-261-003	Bs	1-5	47.5	30.4	4.7	5.1	5.81		44.9	1.9	0.2	0.2	0.3
62°43'42'' N lat.	BC	5-8	13.7	8.7	5.2	5.8	0.89		12.1	0.9	0.2	0.2	0.3
145°33'48'' W long.	2BC	8-14	1.8	4.1	5.2	5.8	0.31			1.1	0.3	0.2	0.2
	2C	14-16	5.1	5.2	5.5	6.3	0.12		1.2	3.0	0.4	0.2	0.3

Table 15. Soil Features

(The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
AF1*:							
Pippod	>60	---	0-0	---	Low	High	High.
Clarena	>60	---	0-0	---	Low	Moderate	Moderate.
AL1*:							
Cobblank, cool	10-20	Hard	0-0	---	Moderate	Moderate	Moderate.
Rock outcrop.							
AL2*:							
Cobblank	10-20	Hard	0-0	---	Moderate	Moderate	Moderate.
Telay	>60	---	0-0	---	Moderate	High	High.
AT1*:							
Chistna	>60	---	0-0	---	Low	Moderate	Moderate.
Pippod	>60	---	0-0	---	Low	High	High.
BR1:							
Cobblank	10-20	Hard	0-0	---	Moderate	Moderate	Moderate.
ESC1*:							
Cryorthents	>60	---	0-0	---	Moderate	High	Moderate.
Cryochrepts	>60	---	0-0	---	Moderate	High	Moderate.
FP1:							
Tangoe sandy loam, frequently flooded	>60	---	0-0	---	Low	Moderate	Moderate.
FP2*:							
Dackey, cool	>60	---	0-0	---	Moderate	Moderate	Low.
Swedna	>60	---	0-0	---	High	Moderate	Moderate.
Swedna, very poorly drained	>60	---	0-0	---	High	Moderate	Moderate.
FP3*:							
Dackey	>60	---	0-0	---	Moderate	Moderate	Low.
Klute, moderately wet	>60	---	0-0	---	Moderate	Moderate	Moderate.
FP4*:							
Dackey	>60	---	0-0	---	Moderate	Moderate	Low.
Swedna, very poorly drained	>60	---	0-0	---	High	Moderate	Moderate.
FP6*:							
Aquatna, frequently flooded	>60	---	0-0	---	High	Moderate	Low.
Hogan, cool	>60	---	0-0	---	Moderate	Moderate	Moderate.

* See footnote at end of table.

Table 15. Soil Features (Continued)

Map symbol and soil name	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
FP12*:							
Tangoe, wet, occasionally flooded	>60	---	0-0	---	Low	Moderate	Moderate.
Tangoe, wet, frequently flooded	>60	---	0-0	---	Low	Moderate	Moderate.
FP13*:							
Swedna, high elevation	>60	---	0-0	---	High	Moderate	Moderate.
Hisna	>60	---	0-0	---	High	Moderate	Moderate.
FP21*:							
Swedna, high elevation	>60	---	0-0	---	High	Moderate	Moderate.
Swedna, very poorly drained	>60	---	0-0	---	High	Moderate	Moderate.
FP22*:							
Dackey, cool	>60	---	0-0	---	Moderate	Moderate	Low.
Swedna, high elevation	>60	---	0-0	---	High	Moderate	Moderate.
Kluna	>60	---	0-0	---	Moderate	Moderate	Moderate.
FP23*:							
Hogan, cool	>60	---	0-0	---	Moderate	Moderate	Moderate.
Sankluna	>60	---	0-0	---	Moderate	Moderate	Moderate.
FP31*:							
Kluna, deep	>60	---	0-0	---	Moderate	Moderate	Low.
Hogan	>60	---	0-0	---	Moderate	Moderate	Moderate.
Kluna, frequently flooded	>60	---	0-0	---	Moderate	High	Moderate.
FP32*:							
Dackey	>60	---	0-0	---	Moderate	Moderate	Low.
Hogan	>60	---	0-0	---	Moderate	Moderate	Moderate.
Klute, moderately wet	>60	---	0-0	---	Moderate	Moderate	Moderate.
GO1*:							
Pippod, high elevation	>60	---	0-0	---	Low	High	High.
Chistna, high elevation	>60	---	0-0	---	Low	Moderate	Moderate.
LC1:							
Klasi peat	>60	---	0-6	6-12	High	Moderate	Low.
LC2:							
Gadona silty clay	>60	---	0-0	---	Moderate	Moderate	Moderate.
LC5*:							
Klasi	>60	---	0-6	6-12	High	Moderate	Low.
Klasi, very wet	>60	---	0-6	6-12	High	Moderate	Low.

* See footnote at end of table.

Table 15. Soil Features (Continued)

Map symbol and soil name	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
LC6*:							
Swillna, thin surface	>60	---	0-6	6-72	High	Moderate	Moderate.
Swillna	>60	---	0-6	6-72	High	Moderate	Moderate.
LL1*:							
Mendna	>60	---	0-6	6-12	High	High	Moderate.
Chelina	>60	---	0-0	---	Moderate	Moderate	Moderate.
LL2*:							
Mendna	>60	---	0-6	6-12	High	High	Moderate.
Ewan	>60	---	0-0	---	High	Moderate	Moderate.
LL3:							
Gadona silty clay	>60	---	0-0	---	Moderate	Moderate	Moderate.
LL12, LL13:							
Chelina loam	>60	---	0-0	---	Moderate	Moderate	Moderate.
LL41*, LL411*:							
Pergelic Cryohemists	>60	---	5-20	15-40	High	High	High.
Mendna, very wet	>60	---	0-6	6-12	High	High	Moderate.
Cryofibrists	>60	---	5-20	15-40	High	High	High.
MK1:							
Hufman peat	>60	---	0-0	---	High	Moderate	Moderate.
MK2*:							
Pergelic Cryohemists	>60	---	5-20	15-40	High	High	High.
Cryofibrists	>60	---	5-20	15-40	High	High	High.
SA1:							
Nickolna silt loam	>60	---	0-0	---	Moderate	Moderate	Moderate.
SA3*:							
Goodview	4-10	Hard	0-0	---	High	High	High.
Rock outcrop.							
ST1*:							
Klute	>60	---	0-0	---	Low	Moderate	Moderate.
Kluna	>60	---	0-0	---	Moderate	Moderate	Moderate.
ST2*:							
Kuslinad	>60	---	0-6	6-12	High	Moderate	Moderate.
Pergelic Cryohemists, dry	>60	---	5-20	15-40	High	High	High.
Hufman	>60	---	0-0	---	High	Moderate	Moderate.

* See footnote at end of table.

Table 15. Soil Features (Continued)

Map symbol and soil name	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
ST3*:							
Dackey------------------------	>60	---	0-0	---	Moderate-------	Moderate-------	Low.
Hogan-------------------------	>60	---	0-0	---	Moderate-------	Moderate-------	Moderate.
ST4:							
Hogan fine sandy loam---------	>60	---	0-0	---	Moderate-------	Moderate-------	Moderate.
ST5:							
Haggard peat------------------	>60	---	0-6	6-12	High-----------	Moderate-------	Moderate.
ST11*:							
Klute-------------------------	>60	---	0-0	---	Low------------	Moderate-------	Moderate.
Tangoe, occasionally flooded--	>60	---	0-0	---	Low------------	Moderate-------	Moderate.
ST12:							
Ogtna mucky fine sandy loam---	>60	---	0-0	---	Moderate-------	Moderate-------	Moderate.
ST13*:							
Tangoe, occasionally flooded--	>60	---	0-0	---	Low------------	Moderate-------	Moderate.
Klute, occasionally flooded---	>60	---	0-0	---	Low------------	Moderate-------	Moderate.
ST21:							
Kuslinad peat-----------------	>60	---	0-6	6-12	High-----------	Moderate-------	Moderate.
ST22*:							
Kuslinad----------------------	>60	---	0-6	6-12	High-----------	Moderate-------	Moderate.
Ganhona-----------------------	>60	---	0-0	---	Moderate-------	Moderate-------	Moderate.
ST24*:							
Kuslinad----------------------	>60	---	0-6	6-12	High-----------	Moderate-------	Moderate.
Kuslinad, very wet------------	>60	---	0-6	6-12	High-----------	Moderate-------	Moderate.
ST24B*:							
Kuslinad----------------------	>60	---	0-6	6-12	High-----------	Moderate-------	Moderate.
Kuslinad, very wet------------	>60	---	0-6	6-12	High-----------	Moderate-------	Moderate.
Kusdry------------------------	>60	---	0-0	---	High-----------	Moderate-------	Low.
ST31*:							
Dackey, cool------------------	>60	---	0-0	---	Moderate-------	Moderate-------	Low.
Hogan, cool-------------------	>60	---	0-0	---	Moderate-------	Moderate-------	Moderate.
ST41*:							
Maclaren----------------------	>60	---	0-0	---	Low------------	Moderate-------	Moderate.
Sinona------------------------	>60	---	0-0	---	Low------------	Moderate-------	Moderate.
ST411*:							
Maclaren----------------------	>60	---	0-0	---	Low------------	Moderate-------	Moderate.
Kuslinad, very wet------------	>60	---	0-6	6-12	High-----------	Moderate-------	Moderate.

* See footnote at end of table.

Table 15. Soil Features (Continued)

Map symbol and soil name	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
ST411*: (cont'd)							
Kuslinad-----------------------	>60	---	0-6	6-12	High-----------	Moderate-------	Moderate.
ST441*:							
Kuslinad-----------------------	>60	---	0-6	6-12	High-----------	Moderate-------	Moderate.
Dackey, cool-------------------	>60	---	0-0	---	Moderate-------	Moderate-------	Low.
TS1*:							
Cryaquepts---------------------	>60	---	0-0	---	High-----------	Moderate-------	Moderate.
TS3:							
Mankomen peat------------------	>60	---	0-6	6-12	High-----------	Moderate-------	Moderate.
TS12*:							
Chelina------------------------	>60	---	0-0	---	Moderate-------	Moderate-------	Moderate.
Mendna-------------------------	>60	---	0-6	6-12	High-----------	High-----------	Moderate.
TS14*:							
Cryaquepts---------------------	>60	---	0-0	---	High-----------	Moderate-------	Moderate.
Cryaquepts, very wet-----------	>60	---	0-0	---	High-----------	Moderate-------	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 16. Comprehensive Hydric Soils List

All map units are displayed regardless of hydric status and are listed in alpha-numeric order by map unit symbol. The "Hydric soils criteria" columns indicate the conditions that caused the map unit component to be classified as "Hydric" or "Non-Hydric". These criteria are defined in "Hydric Soils of the United States" (USDA Miscellaneous Publication No. 1491, June, 1991). See the "Criteria for Hydric Soils" endnote to determine the meaning of these columns. Spot symbols are footnoted at the end of the table. Soils of minor extent are not included in this list.

Map symbol Map unit name	Component	Hydric	Hydric soils criteria: Hydric criteria code*	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
AF1: Pippod-Clarena complex, 2 to 10 percent slopes	Pippod	No				
	Clarena	No				
AL1: Cobblank, cool-Rock outcrop complex, 0 to 30 percent slopes	Cobblank, cool	No				
	Rock outcrop	No				
AL2: Cobblank and Telay soils, 2 to 16 percent slopes	Cobblank	No				
	Telay	No				
AT1: Chistna and Pippod soils, 0 to 14 percent slopes	Chistna	No				
	Pippod	No				
BR1: Cobblank silt loam, 5 to 25 percent slopes	Cobblank	No				
ESC1: Cryorthents and Cryochrepts soils, 20 to 80 percent slopes	Cryorthents	No				
	Cryochrepts	No				
FP1: Tangoe sandy loam, frequently flooded	Tangoe sandy loam, frequently flooded	No				
FP2: Dackey, cool-Swedna-Swedna, very poorly drained, complex, 0 to 8 percent slopes	Dackey, cool	No				
	Swedna	Yes	2b3	Yes	Yes	No
	Swedna, very poorly drained	Yes	2b3,4	Yes	Yes	No
FP3: Dackey-Klute, moderately wet, complex, occasionally flooded	Dackey	No				
	Klute, moderately wet	No				
FP4: Dackey-Swedna, very poorly drained, complex	Dackey	No				
	Swedna, very poorly drained	Yes	2b3,4	Yes	Yes	No

See footnote at end of table.

Table 16. Comprehensive Hydric Soils List (Continued)

Map symbol Map unit name	Component	Hydric	Hydric soils criteria: Hydric criteria code*	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
FP6: Aquatna, frequently flooded-Hogan, cool, complex	Aquatna, frequently flooded	Yes	2b3,4	Yes	Yes	No
	Hogan, cool	No				
FP12: Tangoe, wet, complex	Tangoe, wet, occasionally flooded	No				
	Tangoe, wet, frequently flooded	Yes	2B1,4	Yes	Yes	No
FP13: Swedna, high elevation-Hisna complex, 0 to 6 percent slopes	Swedna, high elevation	Yes	2B3	Yes	No	No
	Hisna	Yes	2B3	Yes	No	No
FP21: Swedna, high elevation, complex	Swedna, high elevation	Yes	2b3,4	Yes	No	No
	Swedna, very poorly drained	Yes	2b3,4	Yes	Yes	No
FP22: Dackey, cool-Swedna, high elevation-Kluna complex	Dackey, cool	No				
	Swedna, high elevation	Yes	2b3,4	Yes	Yes	No
	Kluna	No				
FP23: Hogan, cool-Sankluna complex, 0 to 15 percent slopes	Hogan, cool	No				
	Sankluna	No				
FP31: Kluna, deep-Hogan-Kluna, frequently flooded, complex	Kluna, deep	No				
	Hogan	No				
	Kluna, frequently flooded	No				
FP32: Dackey-Hogan-Klute, moderately wet, complex	Dackey	No				
	Hogan	No				
	Klute, moderately wet	No				
GO1: Pippod and Chistna soils, high elevation, 0 to 30 percent slopes percent slopes	Pippod, high elevation	No				
	Chistna, high elevation	No				
LC1: Klasi peat, 0 to 10 percent slopes	Klasi peat	Yes	2b3	Yes	No	No

See footnote at end of table.

Table 16. Comprehensive Hydric Soils List (Continued)

Map symbol Map unit name	Component	Hydric	Hydric soils criteria: Hydric criteria code*	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
LC2: Gadona silty clay, 0 to 10 percent slopes	Gadona silty clay	No				
LC5: Klasi-Klasi, very wet, complex, 0 to 12 percent slopes	Klasi	Yes	2b3	Yes	No	No
	Klasi, very wet	Yes	2b3,3	Yes	No	Yes
LC6: Swillna, thin surface-Swillna complex, 0 to 15 percent slopes	Swillna, thin surface	No				
	Swillna	Yes	2b3	Yes	No	No
LL1: Mendna and Chelina soils, 0 to 10 percent slopes	Mendna	Yes	2b3	Yes	No	No
	Chelina	No				
LL2: Mendna-Ewan complex, 0 to 6 percent slopes	Mendna	Yes	2b3	Yes	No	No
	Ewan	Yes	2b3	Yes	No	No
LL3: Gadona silty clay, 5 to 20 percent slopes	Gadona silty clay	No				
LL12: Chelina loam, 0 to 10 percent slopes	Chelina loam	No				
LL13: Chelina loam, 7 to 25 percent slopes	Chelina loam	No				
LL41: Pergelic Cryohemists, dry-Cryofibrists complex, 0 to 14 percent slopes	Pergelic Cryohemists, dry	No				
	Cryofibrists	Yes	1,3	Yes	No	Yes
LL411: Pergelic Cryohemists-Mendna, very wet-Cryofibrists complex, 0 to 14 percent slopes	Pergelic Cryohemists	Yes	1,3	Yes	No	Yes
	Mendna, very wet	Yes	2b3,3	Yes	No	Yes
	Cryofibrists	Yes	1,3	Yes	No	Yes
MK1: Hufman peat	Hufman peat	Yes	1,3	Yes	No	Yes
MK2: Pergelic Cryohemists and Cryofibrists soils	Pergelic Cryohemists	Yes	1,3	Yes	No	Yes
	Cryofibrists	Yes	1,3	Yes	No	Yes

See footnote at end of table.

Table 16. Comprehensive Hydric Soils List (Continued)

Map symbol Map unit name	Component	Hydric	Hydric soils criteria: Hydric criteria code*	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
SA1: Nickolna silt loam, 4 to 16 percent slopes	Nickolna silt loam	No				
SA3: Goodview-Rock outcrop complex, 20 to 50 percent slopes	Goodview	No				
	Rock outcrop	No				
ST1: Klute and Kluna soils, 0 to 3 percent slopes	Klute	No				
	Kluna	No				
ST2: Kuslinad-Pergelic Cryohemists, dry-Hufman complex, 0 to 14 percent slopes	Kuslinad	Yes	2b3	Yes	No	No
	Pergelic Cryohemists, dry	No		No	No	No
	Hufman	Yes	1,3	Yes	No	Yes
ST3: Dackey-Hogan complex, 0 to 4 percent slopes	Dackey	No				
	Hogan	No				
ST4: Hogan fine sandy loam	Hogan fine sandy loam	No				
ST5: Haggard peat, 0 to 4 percent slopes	Haggard peat	Yes	1,3	Yes	No	Yes
ST11: Klute-Tangoe, occasionally flooded, complex	Klute	No				
	Tangoe, occasionally flooded	No				
ST12: Ogtna mucky fine sandy loam	Ogtna mucky fine sandy loam	No				
ST13: Tangoe, occasionally flooded-Klute, occasionally flooded, complex, 2 to 7 percent slopes	Tangoe, occasionally flooded	No				
	Klute, occasionally flooded	No				
ST21: Kuslinad peat	Kuslinad peat	Yes	2b3	Yes	No	No
ST22: Kuslinad-Ganhona complex, 0 to 20 percent slopes	Kuslinad	Yes	2b3	Yes	No	No
	Ganhona	No				

See footnote at end of table.

Table 16. Comprehensive Hydric Soils List (Continued)

Map symbol Map unit name	Component	Hydric	Hydric soils criteria: Hydric criteria code*	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
ST24: Kuslinad-Kuslinad, very wet, complex	Kuslinad	Yes	2b3	Yes	No	No
	Kuslinad, very wet	Yes	2b3,3	Yes	No	Yes
ST24B: Kuslinad-Kuslinad, very wet-Kusdry complex	Kuslinad	Yes	2b3	Yes	No	No
	Kuslinad, very wet	Yes	2b3,3	Yes	No	Yes
	Kusdry	No				
ST31: Dackey, cool-Hogan, cool, complex 0 to 4 percent slopes	Dackey, cool	No				
	Hogan, cool	No				
ST41: Maclaren-Sinona complex, 0 to 15 percent slopes	Maclaren	No				
	Sinona	No				
ST411: Maclaren-Kuslinad complex, 0 to 15 percent slopes	Maclaren	No				
	Kuslinad, very wet	Yes	2b3,3	Yes	No	Yes
	Kuslinad	Yes	2b3	Yes	No	No
ST441: Kuslinad-Dackey, cool, complex, 0 to 2 percent slopes	Kuslinad	Yes	2b3	Yes	No	No
	Dackey, cool	No				
TS1: Cryaquepts, 4 to 25 percent slopes	Cryaquepts	Yes	2b3	Yes	No	No
TS3: Mankomen peat, 0 to 15 percent slopes	Mankomen peat	Yes	2b3	Yes	No	No
TS12: Chelina and Mendna soils, 6 to 20 percent slopes	Chelina	No				
	Mendna	Yes	2b3	Yes	No	No
TS14: Cryaquepts and Cryaquepts, very wet, soils, 4 to 25 percent slopes	Cryaquepts	Yes	2b3	Yes	No	No
	Cryaquepts, very wet	Yes	2b3,3	Yes	No	Yes
W: Water	Water	Unranked				

FOOTNOTE: There may be small areas of included soils or miscellaneous areas that are significant to use and management of the soil, yet are too small to delineate on the soil map at the map's original scale. These may be designated as spot symbols and are defined in the published Soil Survey Report or the USDA-NRCS Technical Guide, Part II.

Hydric soils criteria codes and definitions:

1. All Histosols, except Folists, or
2. Soils in Aquic suborder, Aquic subgroup, Albolls suborder, Salorthids great group, Pell great group of Vertisols, Pachic subgroup, or Cumulic subgroups that are:
   a. somewhat poorly drained and have a frequently occurring water table less than 0.5 feet from the surface for a significant period (usually 14 consecutive days or more) during the growing season, or
   b. poorly drained or very poorly drained and have either:
      (1) a frequently occurring water table less than 0.5 feet from the surface for a significant period (usually 14 consecutive days or more) during the growing season if textures are coarse sand, sand, or fine sand in all layers within 20 inches, or for other soils,
      (2) a frequently occurring water table less than 1.0 feet from the surface for a significant period (usually 14 consecutive days or more) during the growing season if permeability is equal to or greater than 6.0 in/hr in all layers within 20 inches, or
      (3) a frequently occurring water table less than 1.5 feet from the surface for a significant period (usually 14 consecutive days or more) during the growing season if permeability is less than 6.0 in/hr in any layers within 20 inches, or
3. Soils that are frequently ponded for long or very long duration during the growing season, or
4. Soils that are frequently flooded for long or very long duration during the growing season.

Table 17. Water Features of Soils

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.)

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
AF1*:							
Pippod	A	None	---	---	>6.0	---	---
Clarena	B	None	---	---	>6.0	---	---
AL1*:							
Cobblank, cool	D	None	---	---	>6.0	---	---
Rock outcrop.							
AL2*:							
Cobblank	D	None	---	---	>6.0	---	---
Telay	B	None	---	---	>6.0	---	---
AT1*:							
Chistna	B	None	---	---	>6.0	---	---
Pippod	A	None	---	---	>6.0	---	---
BR1:							
Cobblank	D	None	---	---	>6.0	---	---
ESC1*:							
Cryorthents	B	None	---	---	>6.0	---	---
Cryochrepts	B	None	---	---	>6.0	---	---
FP1:							
Tangoe sandy loam, frequently flooded	C	Frequent	Brief to long	May-Sep	1.5-3.0	Apparent	May-Sep
FP2*:							
Dackey, cool	C	Occasional	Brief	May-Sep	1.5-3.5	Apparent	May-Sep
Swedna	D	Frequent	Brief to long	May-Sep	0.5-1.5	Apparent	May-Sep
Swedna, very poorly drained	D	Frequent	Long	May-Sep	0.-0.5	Apparent	May-Sep
FP3*:							
Dackey	C	Occasional	Brief	May-Sep	1.5-3.5	Apparent	May-Sep
Klute, moderately wet	B	Occasional	Brief	May-Sep	4.0-6.0	Apparent	May-Sep
FP4*:							
Dackey	C	Occasional	Brief	May-Sep	1.5-3.5	Apparent	May-Sep
Swedna, very poorly drained	D	Frequent	Long	May-Sep	0.-0.5	Apparent	May-Sep

* See footnote at end of table.

Table 17. Water Features of Soils (Continued)

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
FP6*:							
Aquatna, frequently flooded--------------	D	Frequent--------	Long----------	May-Sep	0.-1.0	Apparent	May-Sep
Hogan, cool-----------	C	Rare------------	---	---	>6.0	---	---
FP12*:							
Tangoe, wet, occasionally flooded--------------	C	Occasional------	Brief to long	May-Sep	1-2.0	Apparent	May-Sep
Tangoe, wet, frequently flooded--------------	C	Frequent--------	Long----------	May-Sep	0-1.0	Apparent	May-Sep
FP13*:							
Swedna, high elevation	D	Occasional------	Brief to long	May-Sep	0.5-1.5	Apparent	May-Sep
Hisna-----------------	D	Occasional------	Brief to long	May-Sep	0.-1.5	Apparent	May-Sep
FP21*:							
Swedna, high elevation	D	Occasional------	Brief to long	May-Sep	0.5-1.5	Apparent	May-Sep
Swedna, very poorly drained--------------	D	Frequent--------	Long----------	May-Sep	0.-0.5	Apparent	May-Sep
FP22*:							
Dackey, cool----------	C	Occasional------	Brief---------	May-Sep	1.5-3.5	Apparent	May-Sep
Swedna, high elevation	D	Frequent--------	Brief to long	May-Sep	0.5-1.5	Apparent	May-Sep
Kluna-----------------	B	Occasional------	Brief---------	May-Sep	4.0-6.0	Apparent	May-Sep
FP23*:							
Hogan, cool-----------	C	Rare------------	---	---	>6.0	---	---
Sankluna--------------	B	Occasional------	Brief to long	May-Sep	4.0-6.0	Apparent	May-Sep
FP31*:							
Kluna, deep-----------	B	Occasional------	Brief---------	May-Sep	>6.0	---	---
Hogan-----------------	C	Rare------------	---	---	>6.0	---	---
Kluna, frequently flooded--------------	B	Frequent--------	Brief to long	May-Sep	4.0-6.0	Apparent	May-Sep
FP32*:							
Dackey----------------	C	Occasional------	Brief---------	May-Sep	1.5-3.5	Apparent	May-Sep
Hogan-----------------	C	Rare------------	---	---	>6.0	---	---
Klute, moderately wet-	B	Occasional------	Brief---------	May-Sep	4.0-6.0	Apparent	May-Sep
GO1*:							
Pippod, high elevation	A	None------------	---	---	>6.0	---	---
Chistna, high elevation	B	None------------	---	---	>6.0	---	---
LC1:							
Klasi peat------------	D	None------------	---	---	0.5-1.5	Perched	Jan-Dec

* See footnote at end of table.

Table 17. Water Features of Soils (Continued)

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
LC2:							
Gadona silty clay-----	B	None------------	---	---	>6.0	---	---
LC5*:							
Klasi-----------------	D	None------------	---	---	0.5-1.5	Perched	Jan-Dec
Klasi, very wet-------	D	None------------	---	---	+1.0-0.5	Perched	Jan-Dec
LC6*:							
Swillna, thin surface-	D	None------------	---	---	2.0-3.0	Perched	Jan-Dec
Swillna---------------	D	None------------	---	---	0.-1.5	Perched	Jan-Dec
LL1*:							
Mendna----------------	D	None------------	---	---	0.5-1.5	Perched	Jan-Dec
Chelina---------------	B	None------------	---	---	>6.0	---	---
LL2*:							
Mendna----------------	D	None------------	---	---	0.5-1.5	Perched	Jan-Dec
Ewan------------------	D	Occasional------	Brief---------	May-Sep	0.-1.5	Apparent	Jan-Dec
LL3:							
Gadona silty clay-----	B	None------------	---	---	>6.0	---	---
LL12, LL13:							
Chelina loam----------	B	None------------	---	---	>6.0	---	---
LL41*:							
Pergelic Cryohemists, dry------------------	C	None------------	---	---	>6.0	---	---
Cryofibrists----------	D	None------------	---	---	+1.5-1.0	Apparent	Jan-Dec
LL411*:							
Pergelic Cryohemists--	D	None------------	---	---	+1.0-1.0	Perched	Jan-Dec
Mendna, very wet------	D	None------------	---	---	+1.0-0.5	Perched	Jan-Dec
Cryofibrists----------	D	None------------	---	---	+1.5-1.0	Apparent	Jan-Dec
MK1:							
Hufman peat-----------	D	Rare------------	---	---	+1.5-0.5	Apparent	Jan-Dec
MK2*:							
Pergelic Cryohemists--	D	None------------	---	---	+1.0-1.0	Perched	Jan-Dec
Cryofibrists----------	D	None------------	---	---	+1.5-1.0	Apparent	Jan-Dec
SA1:							
Nickolna silt loam----	B	None------------	---	---	>6.0	---	---
SA3*:							
Goodview--------------	D	None------------	---	---	>6.0	---	---
Rock outcrop.							

* See footnote at end of table.

Table 17. Water Features of Soils (Continued)

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
ST1*:							
Klute-----------------	B	Occasional------	Brief---------	May-Sep	>6.0	---	---
Kluna-----------------	B	Occasional------	Brief---------	May-Sep	4.0-6.0	Apparent	May-Sep
ST2*:							
Kuslinad--------------	D	None------------	---	---	0.5-1.5	Perched	Jan-Dec
Pergelic Cryohemists, dry------------------	C	None------------	---	---	>6.0	---	---
Hufman----------------	D	Rare------------	---	---	+1.5-0.5	Apparent	Jan-Dec
ST3*:							
Dackey----------------	C	Occasional------	Brief---------	May-Sep	1.5-3.5	Apparent	May-Sep
Hogan-----------------	C	Rare------------	---	---	>6.0	---	---
ST4:							
Hogan fine sandy loam-	C	Rare------------	---	---	>6.0	---	---
ST5:							
Haggard peat----------	D	None------------	---	---	+1.0-1.0	Perched	Jan-Dec
ST11*:							
Klute-----------------	B	Occasional------	Brief---------	May-Sep	>6.0	---	---
Tangoe, occasionally flooded--------------	C	Occasional------	Brief---------	May-Sep	2.0-3.5	Apparent	May-Sep
ST12:							
Ogtna mucky fine sandy loam-----------------	B	None------------	---	---	>6.0	---	---
ST13*:							
Tangoe, occasionally flooded--------------	C	Occasional------	Brief---------	May-Sep	2.0-3.5	Apparent	May-Sep
Klute, occasionally flooded--------------	B	Occasional------	Brief---------	May-Sep	>6.0	---	---
ST21:							
Kuslinad peat---------	D	None------------	---	---	0.5-1.5	Perched	Jan-Dec
ST22*:							
Kuslinad--------------	D	None------------	---	---	0.5-1.5	Perched	Jan-Dec
Ganhona---------------	C	None------------	---	---	>6.0	---	---
ST24*:							
Kuslinad--------------	D	None------------	---	---	0.5-1.5	Perched	Jan-Dec
Kuslinad, very wet----	D	None------------	---	---	+1.0-0.5	Perched	Jan-Dec

* See footnote at end of table.

Table 17. Water Features of Soils (Continued)

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
ST24B*:							
Kuslinad--------------	D	None------------	---	---	0.5-1.5	Perched	Jan-Dec
Kuslinad, very wet----	D	None------------	---	---	+1.0-0.5	Perched	Jan-Dec
Kusdry----------------	C	None------------	---	---	1.5-3.0	Apparent	May-Sep
ST31*:							
Dackey, cool----------	C	Occasional------	Brief---------	May-Sep	1.5-3.5	Apparent	May-Sep
Hogan, cool-----------	C	Rare------------	---	---	>6.0	---	---
ST41*:							
Maclaren--------------	B	None------------	---	---	>6.0	---	---
Sinona----------------	B	None------------	---	---	>6.0	---	---
ST411*:							
Maclaren--------------	B	None------------	---	---	>6.0	---	---
Kuslinad, very wet----	D	None------------	---	---	+1.0-0.5	Perched	Jan-Dec
Kuslinad--------------	D	None------------	---	---	0.5-1.5	Perched	Jan-Dec
ST441*:							
Kuslinad--------------	D	None------------	---	---	0.5-1.5	Perched	Jan-Dec
Dackey, cool----------	C	Occasional------	Brief---------	May-Sep	1.5-3.5	Apparent	May-Sep
TS1*:							
Cryaquepts------------	D	None------------	---	---	0.5-1.5	Perched	Jan-Dec
TS3:							
Mankomen peat---------	D	None------------	---	---	0.5-1.5	Perched	Jan-Dec
TS12*:							
Chelina---------------	B	None------------	---	---	>6.0	---	---
Mendna----------------	D	None------------	---	---	0.5-1.5	Perched	Jan-Dec
TS14*:							
Cryaquepts------------	D	None------------	---	---	0.5-1.5	Perched	Jan-Dec
Cryaquepts, very wet--	D	None------------	---	---	+1.0-0.5	Perched	Jan-Dec

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 18. Classification of Soils

Soil series	Classification
Aquatna	Coarse-loamy, mixed, nonacid Typic Cryaquents
Chelina	Fine-loamy, mixed Typic Cryochrepts
Chistna	Sandy, mixed Typic Cryochrepts
Clarena	Coarse-loamy over sandy or sandy-skeletal, mixed Typic Haplocryods
Cobblank	Loamy-skeletal, mixed Lithic Cryochrepts
Cryaquepts	Cryaquepts
Cryochrepts	Cryochrepts
Cryofibrists	Cryofibrists
Cryorthents	Cryorthents
Dackey	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid Oxyaquic Cryofluvents
Ewan	Fine-loamy, mixed, nonacid Typic Cryaquepts
Gadona	Fine, mixed Typic Cryochrepts
Ganhona	Coarse-loamy, mixed Typic Cryochrepts
Goodview	Loamy, mixed Lithic Cryumbrepts
Haggard	Loamy, mixed, euic Pergelic Cryohemists
Hisna	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid Histic Cryaquepts
Hogan	Loamy, mixed, nonacid Pergelic Cryorthents
Hufman	Loamy, mixed, euic Terric Cryofibrists
Klasi	Clayey, mixed, nonacid Histic Pergelic Cryaquepts
Kluna	Coarse-loamy, mixed, nonacid Typic Cryofluvents
Klute	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid Typic Cryofluvents
Kusdry	Coarse-loamy, mixed Aquic Cryochrepts
Kuslinad	Loamy, mixed, nonacid Histic Pergelic Cryaquepts
Maclaren	Coarse-loamy over sandy or sandy-skeletal, mixed Typic Cryochrepts
Mankomen	Sandy, mixed, nonacid Histic Pergelic Cryaquepts
Mendna	Loamy, mixed, nonacid Histic Pergelic Cryaquepts
Nickolna	Fine-loamy, mixed Entic Cryumbrepts
Ogtna	Coarse-loamy over sandy or sandy-skeletal, mixed Entic Cryumbrepts
Pergelic Cryohemists	Pergelic Cryohemists
Pippod	Sandy-skeletal, mixed Typic Haplocryods
Sankluna	Sandy, mixed, nonacid Typic Cryofluvents
Sinona	Sandy-skeletal, mixed Typic Cryochrepts
Swedna	Coarse-loamy over sandy or sandy-skeletal, mixed Typic Cryaquents
Swillna	Clayey, mixed, nonacid Pergelic Ruptic-Histic Cryaquepts
Tangoe	Sandy-skeletal, mixed, nonacid Oxyaquic Cryorthents
Telay	Loamy-skeletal, mixed Typic Cryochrepts

Table 19. Vegetation Cover Type Classification

Aquatic herbaceous

Balsam poplar/thinleaf alder open forest
Populus balsamifera/Alnus tenuifolia open forest
POBA2/ALTE2

Balsam poplar-white spruce/thinleaf alder open forest
Populus balsamifera-Picea glauca/Alnus tenuifolia open forest
POBA2-PIGL/ALTE2

Black spruce/closed sheath cottongrass woodland
Picea mariana/Eriophorum brachyantherum woodland
PIMA/ERBR6

Low shrub birch scrub
Betula glandulosa scrub
BEGL

Low shrub birch/closed sheath cottongrass scrub
Betula glandulosa/Eriophorum brachyantherum scrub
BEGL/ERBR6

Low shrub birch/lichen scrub
Betula glandulosa/lichen scrub
BEGL/lichen

Low shrub birch-willow/water sedge scrub
Betula glandulosa-Salix spp./*Carex aquatilis* scrub
BEGL-SAPL2/CAAQ

Low willow/herb scrub
Salix spp./herb scrub
SALIX/herb

Low willow/herb2 scrub
Salix spp./herb2 scrub
SALIX/herb2

Low willow/water sedge scrub
Salix spp./*Carex aquatilis* scrub
SALIX/CAAQ

Quaking aspen forest
Populus tremuloides forest
POTR5

Quaking aspen-white spruce forest
Populus tremuloides-Picea glauca forest
POTR5-PIGL

Sedge wet meadow
Carex spp. wet meadow
CAREX

Sedge-grass riparian meadow
Carex aquatilis-Calamagrostis canadensis riparian meadow
riparian

Sparsely vegetated alluvium

Sparsely vegetated escarpments

Sparsely vegetated outwash

Spruce/alder woodland
Picea spp./*Alnus* spp. woodland
PICEA/ALNUS

Spruce/lichen woodland
Picea spp./lichen woodland
PICEA/lichen

Spruce/shrub birch woodland
Picea spp./*Betula glandulosa* woodland
PICEA/BEGL

Spruce/spruce muskeg sedge open forest
Picea spp./*Carex lugens* open forest
PICEA/CALU2

Spruce/water sedge woodland
Picea spp./*Carex aquatilis* woodland
PICEA/CAAQ

Spruce/willow woodland
Picea spp./*Salix* spp. woodland
PICEA/SAPL2

Tall feltleaf willow scrub
Salix alaxensis scrub
SAAL

Tall feltleaf willow/alder scrub
Salix alaxensis/Alnus tenuifolia scrub
SAAL2

Tall green alder scrub
Alnus crispa scrub
ALNUS

Tall thinleaf alder scrub
Alnus tenuifolia scrub
ALTE2

Tall thinleaf alder-feltleaf willow scrub
Alnus tenuifolia-Salix alaxensis scrub
ALTE2-SAAL

Tall thinleaf alder/willow scrub
Alnus tenuifolia/Salix spp. scrub
ALTE2/SALIX

White spruce forest
Picea glauca forest
PIGL

White spruce/ericaceous shrub open forest
Picea glauca/ericaceous shrub open forest
PIGL/erica

White spruce/moss forest
Picea glauca/moss forest

White spruce/thinleaf alder open forest
Picea glauca/Alnus tenuifolia open forest
PIGL/ALTE2

White spruce/willow open forest
Picea glauca/Salix spp. open forest
PIGL/SALIX

Table 20. Checklist of Vascular Plants

Only plants observed or tentatively identified during field work are listed. Scientific nomenclature follows Hultén (*1968*), Viereck and Little (*1972*), and Welsh (*1974*). MISCELLANEOUS CODES includes ADP symbols for plant groups and layers in stand descriptions.

Symbol	Scientific name	Common name
*** TREES ***		
BEPA	Betula papyrifera Marsh.	paper birch
PICEA	Picea A. Dietr.	spruce
PIGL	Picea glauca (Moench) Voss	white spruce
PIMA	Picea mariana (P. Mill.) B.S.P.	black spruce
POBA2	Populus balsamifera L.	balsam poplar
POTR5	Populus tremuloides Michx.	quaking aspen
*** SHRUBS ***		
ALCR6	Alnus crispa (Ait.) Pursh	green alder
ALTE2	Alnus tenuifolia Nutt.	thinleaf alder
ANPO	Andromeda polifolia L.	bog rosemary
ARAL2	Arctostaphylos alpina (L.) Spreng.	alpine bearberry
ARRU	Arctostaphylos rubra (Rehd. & Wilson) Fern.	red bearberry
ARUV	Arctostaphylos uva-ursi (L.) Spreng.	kinnikinnick
ARAR9	Artemisia arctica Less.	boreal sagebrush
BETULX	Betula (hybrids)	shrub birch (hybrid)
BEGL	Betula glandulosa Michx.	shrub birch
BENA	Betula nana L.	shrub birch
CATE11	Cassiope tetragona (L.) D. Don	arctic mountain-heather
CHCA2	Chamaedaphne calyculata (L.) Moench	leatherleaf
EMNI	Empetrum nigrum L.	black crowberry
JUCON8	Juniperus communis ssp. nana (Willd.) Syme	common juniper
LEDUM	Ledum L.	Labrador-tea
LEDE5	Ledum decumbens (Ait.) Lodd. ex Steud.	Labrador-tea
LEGR	Ledum groenlandicum Oeder	Labrador-tea
MYGA	Myrica gale L.	sweetgale
OXMI3	Oxycoccus microcarpos Turcz. ex Rupr.	small cranberry
POFR4	Potentilla fruticosa auct. non L.	shrubby cinquefoil
RIBES	Ribes L.	currant
RIBR	Ribes bracteosum Dougl. ex Hook.	stink currant
RIHU	Ribes hudsonianum Richards.	northern black currant
RITR	Ribes triste Pallas	swamp red currant
ROAC	Rosa acicularis Lindl.	prickly rose
SALIX	Salix L.	willow
SAAL	Salix alaxensis (Anderss.) Coville	feltleaf willow
SAAR3	Salix arbusculoides Anderss.	little tree willow
SABA3	Salix barclayi Anderss.	Barclay willow
SABE2	Salix bebbiana Sarg.	gray willow
SAFU	Salix fuscescens Anderss.	Alaska bog willow
SAGL	Salix glauca L.	grayleaf willow
SAMO2	Salix monticola Bebb	park willow
SAMY	Salix myrtillifolia Anderss.	blueberry willow
SANO2	Salix novae-angliae auct. non Anderss.	tall blueberry willow
SAPL2	Salix planifolia Pursh	diamondleaf willow
SARE2	Salix reticulata L.	net vein willow
SARI4	Salix richardsonii Hook.	wooly willow
SASC	Salix scouleriana Barratt ex Hook.	Scouler willow
SHCA	Shepherdia canadensis (L.) Nutt.	russet buffalo-berry

Table 20. Checklist of Vascular Plants (Continued)

SYMBOL	Scientific name	Common name
***SHRUBS (continued) ***		
SPBE	Spiraea beauverdiana auct. non Schneid.	Beauverd spiraea
VAOV	Vaccinium ovalifolium Sm.	oval-leaf blueberry
VAUL	Vaccinium uliginosum L.	bog blueberry
VAVI	Vaccinium vitis-idaea L.	lowbush cranberry
VIED	Viburnum edule (Michx.) Raf.	highbush cranberry
*** FORBS ***		
ACMI2	Achillea millefolium L.	common yarrow
ACDE2	Aconitum delphiniifolium DC.	larkspur-leaf monkshood
ALSC	Allium schoenoprasum L.	wild chives
AMRO	Amerorchis rotundifolia (Banks ex Pursh) Hluten	roundleaf orchid
ANEMO	Anemone L.	anemone
ANRI	Anemone richardsonii Hook.	yellow thimbleweed
ANTEN	Antennaria Gaertn.	pussytoes
ANRO2	Antennaria rosea Greene	rosy pussytoes
ARNIC	Arnica L.	arnica
ARTEM	Artemisia L.	wormwood
ARTI	Artemisia tilesii Ledeb.	Tilesius' wormwood
ASSI	Aster sibiricus L.	arctic aster
ASTRA	Astragalus L.	milk-vetch
ASAM3	Astragalus americanus (Hook.) M.E. Jones	American milk-vetch
ASBO	Astragalus bodinii Sheldon	Bodin's milk-vetch
BORO	Boschniakia rossica (Cham. & Schlecht.) Fedtsch.	northern groundcone
CALTH	Caltha L.	marsh-marigold
CALA7	Campanula lasiocarpa Cham.	Alaska bellflower
CAPRA	Cardamine pratensis var. angustifolia Hook.	cuckoo flower
CASTI2	Castilleja Mutis ex L. f.	Indian-paintbrush
CAUN4	Castilleja unalaschcensis (Cham. & Schlecht.) Malte	Alaska Indian-paintbrush
CHTE3	Chrysosplenium tetrandrum (Lund) Th. Fries	northern golden-saxifrage
CIMA	Cicuta mackenzieana Raup	Mackenzie's water hemlock
CLSA2	Claytonia sarmentosa C.A. Mey.	Alaska springbeauty
COTR3	Corallorrhiza trifida Chatelain	coral root
COCA13	Cornus canadensis L.	Canadian bunchberry
CYMO2	Cypripedium montanum Dougl. ex Lindl.	mountain lady's slipper
DEGL3	Delphinium glaucum S. Wats.	tall larkspur
DOFR	Dodecatheon frigidum Cham. & Schlecht.	western arctic shootingstar
DRAN	Drosera anglica Huds.	English sundew
EPILO	Epilobium L.	willowherb
EPAN2	Epilobium angustifolium L.	common fireweed
EPDA	Epilobium davuricum Fisch. ex Hornem.	willowherb
EPLA	Epilobium latifolium L.	dwarf fireweed
EPPA	Epilobium palustre L.	marsh willowherb
ERIGE2	Erigeron L.	fleabane
ERAC2	Erigeron acris L.	fleabane
FRVI	Fragaria virginiana Duchesne	Virginia strawberry
GABO2	Galium boreale L.	northern bedstraw
GAKA	Galium kamtschaticum Steller ex J.A. & J.H. Schultes	boreal bedstraw
GATR2	Galium trifidum L.	three-petal bedstraw
GENTI	Gentiana L.	gentian
GEPR7	Gentiana propinqua Richards.	dwarf-gentian
GELI2	Geocaulon lividum (Richards.) Fern.	northern commandra
GEMA4	Geum macrophyllum Willd.	large-leaf avens

Table 20. Checklist of Vascular Plants (Continued)

SYMBOL	Scientific name	Common name
*** FORBS (continued) ***		
HEAL	Hedysarum alpinum L.	alpine sweet-vetch
HEMA	Hedysarum mackenziei Richards.	boreal sweet-vetch
HIVU2	Hippurus vulgaris L.	common mare's-tail
LIBO3	Linnaea borealis L.	American twinflower
LUAR2	Lupinus arcticus S. Wats.	arctic lupine
METR3	Menyanthes trifoliata L.	buckbean
MEPA	Mertensia paniculata (Ait.) G. Don	tall bluebells
MOLA6	Moehringia lateriflora (L.) Fenzl	bluntleaf sandword
MOUN2	Moneses uniflora (L.) Gray	single delight
NUPHA	Nuphar polysepalum Engelm.	yellow pondlily
PAPA8	Parnassia palustris L.	marsh grass-of-parnassus
PEDIC	Pedicularis L.	lousewort
PELA	Pedicularis labradorica Wirsing	Labrador lousewort
PEFR5	Petasites frigidus (L.) Fries	arctic sweet coltsfoot
PEHY5	Petasites hyperboreus Rydb.	arctic sweet coltsfoot
PESA5	Petasites sagittatus (Banks ex Pursh) Gray	arrowleaf sweet coltsfoot
PIVU	Pinguicula vulgaris L.	hairy butterwort
PLATA2	Platanthera L.C. Rich.	bog orchid
PLHY2	Platanthera hyperborea (L.) Lindl.	northern green orchid
POAC	Polemonium acutiflorum Willd. ex Roemer & J.A. Schultes	tall Jacob`s-ladder
POLYG4	Polygonum L.	bistort
POBI5	Polygonum bistorta L.	meadow bistort
POVI3	Polygonum viviparum L.	serpent-grass
POTAM	Potamogeton L.	pondweed
POPA14	Potentilla palustris (L.) Scop.	marsh cinquefoil
PYROL	Pyrola L.	wintergreen
PYAS	Pyrola asarifolia Michx.	pink wintergreen
PYMI	Pyrola minor L.	snowline wintergreen
PYSE	Pyrola secunda L.	one-sided wintergreen
RANUN	Ranunculus L.	buttercup
RAAQ	Ranunculus aquatilis L.	whitewater crowfoot
ROHI2	Rorippa hispida (Desv.) Britt.	bog yellowcress
RUAR	Rubus arcticus L.	northern blackberry
RUCH	Rubus chamaemorus L.	cloudberry
RUMEX	Rumex L.	dock
RUAR6	Rumex arcticus Trautv.	arctic dock
SAST11	Sanguisorba stipulata Raf.	Sitka burnet
SAAN3	Saussurea angustifolia (Willd.) DC.	narrow-leaf saw-wort
SEROI3	Sedum rosea ssp. integrifolium (Raf.) Hulten	stonecrop
SENEC	Senecio L.	ragwort
SEAT2	Senecio atropurpureus (Ledeb.) Fedtsch.	dark-purple ragwort
SELU	Senecio lugens Richards.	small black-tip ragwort
SPARG	Sparganium L.	burreed
SPRO	Spiranthes romanzoffiana Cham.	hooded ladies'-tresses
STELL	Stellaria L.	starwort
SWPE	Swertia perennis L.	felwort
TAOF	Taraxacum officinale G.H. Weber	common dandelion
THSP	Thalictrum sparsiflorum Turcz. ex Fisch. & C.A. Mey.	few-flower meadowrue
TOCO	Tofieldia coccinea Richards.	northern false asphodel
TREU	Trientalis europaea L.	arctic starflower

Table 20. Checklist of Vascular Plants (Continued)

SYMBOL	Scientific name	Common name
*** FORBS (continued) ***		
TRMA4	Triglochin maritimum L.	seaside arrowgrass
VALER	Valeriana L.	valerian
VACA3	Valeriana capitata Pallas ex Link	clustered valerian
VASI	Valeriana sitchensis Bong.	Sitka valerian
VERON	Veronica L.	speedwell
VIOLA	Viola L.	violet
*** FERNS ***		
BOLU	Botrychium lunaria (L.) Sw.	common moonwort
CYFR2	Cystopteris fragilis (L.) Bernh.	brittle bladderfern
*** HORSETAILS ***		
EQUIS	Equisetum L.	horsetail
EQAR	Equisetum arvense L.	field horsetail
EQFL	Equisetum fluviatile L.	water horsetail
EQHY	Equisetum hyemale L.	tall scouring-rush
EQPA	Equisetum palustre L.	marsh horsetail
EQPR	Equisetum pratense Ehrh.	meadow horsetail
EQSC	Equisetum scirpoides Michx.	dwarf scouring-rush
EQSY	Equisetum sylvaticum L.	woodland horsetail
EQVA	Equisetum variegatum Schleich. ex F. Weber & D.M.H. Mohr	variegated scouring-rush
*** CLUBMOSSES ***		
LYCOP2	Lycopodium L.	clubmoss
LYAN2	Lycopodium annotinum L.	stiff clubmoss
LYCO3	Lycopodium complanatum L.	clubmoss
LYSE	Lycopodium selago L.	fir clubmoss
*** GRASSES ***		
AGROP2	Agropyron Gaertn.	wheatgrass
AGTR	Agropyron trachycaulum (Link) Malte ex H.F. Lewis	slender wheatgrass
AGSC5	Agrostis scabra Willd.	rough bent
ALAE	Alopecurus aequalis Sobol.	short-awn foxtail
ARLA2	Arctagrostis latifolia (R. Br.) Griseb.	polar grass
ARFU2	Arctophila fulva (Trin.) Anderss.	pendent grass
BESY	Beckmannia syzigachne (Steud.) Fern.	American slough grass
CALAM	Calamagrostis Adans.	reedgrass
CACA4	Calamagrostis canadensis (Michx.) Beauv.	bluejoint reedgrass
CAIN	Calamagrostis inexpansa Gray	reedgrass
CAPU	Calamagrostis purpurascens R. Br.	purple reedgrass
ELYMU	Elymus L.	wild rye
FESTU	Festuca L.	fescue
FEAL	Festuca altaica Trin.	rough fescue
HIAL3	Hierochloe alpina (Sw. ex Willd.) Roemer & J.A. Schultes	alpine sweet grass
HIOD	Hierochloe odorata (L.) Beauv.	vanilla grass
MELIC	Melica L.	melic grass
POA	Poa L.	blue grass
PUAN2	Puccinellia angustata Swallen	northern alkali grass
TRSP2	Trisetum spicatum (L.) Richter	narrow false oat
*** SEDGES & RUSHES ***		
CAREX	Carex L.	sedge
CAAQ	Carex aquatilis Wahlenb.	water sedge
CAAU3	Carex aurea Nutt.	golden-fruit sedge
CADIG	Carex dioica L.	northern bog sedge
CALA13	Carex laeviculmis Meinsh	smooth-stem sedge

Table 20. Checklist of Vascular Plants (Continued)

SYMBOL	Scientific name	Common name
*** SEDGES & RUSHES (continued) ***		
CALE10	Carex leptalea Wahlenb.	bristly-stalk sedge
CALU2	Carex lugens Holm	spruce muskeg sedge
CAME4	Carex membranacea Hook.	fragile seed sedge
CARH3	Carex rhynchophysa Fisch., C.A. Mey. & Ave-Lall.	Northwest Territory sedge
CARO6	Carex rostrata Stokes	swollen-beaked sedge
CASA10	Carex saxatilis L.	russet sedge
ELEOC	Eleocharis R. Br.	spike-rush
ERIOP	Eriophorum L.	cottongrass
ERAN6	Eriophorum angustifolium Honckeny	tall cottongrass
ERBR6	Eriophorum brachyantherum Trautv. & C.A. Mey.	closed-sheath cottongrass
ERGR8	Eriophorum gracile W.D.J. Koch	slender cottongrass
ERSC2	Eriophorum scheuchzeri Hoope	white cottongrass
JUNCU	Juncus L.	rush
JUAR2	Juncus arcticus Willd.	arctic rush
LUZUL	Luzula DC.	wood-rush
LUMU2	Luzula multiflora (Ehrh.) Lej.	common wood-rush
LUPA4	Luzula parviflora (Ehrh.) Desv.	small-flower wood-rush
TRAL7	Trichophorum alpinum [L]Pers.	alpine cottongrass
TRCE3	Trichophorum cespitosum (L.) Hartm.	tufted bullrush
*** MISCELANEOUS CODES ***		
FORBS	All forbs	All forbs
GRASSES	All grasses	All grasses
SEDGES	All sedges and rushes	All sedges and rushes
SOIL	Bare soil	Bare soil
CRYPTHT	Height, cryptogam layer	Height, cryptogam layer
HERBHT	Height, herb layer	Height, herb layer
SHRUBHT2	Height, lower shrub layer	Height, lower shrub layer
TREEHT2	Height, lower tree layer	Height, lower tree layer
SHRUBHT	Height, shrub layer	Height, shrub layer
TREEHT	Height, tree layer	Height, tree layer
LICHEN	Lichen layer	Lichen layer
LITTER	Litter and mulch	Litter and mulch
MOSS	Moss layer	Moss layer
ROCK	Rock fragments	Rock fragments
WATER	Surface water	Surface water
ZZFORB	Unknown forb	Unknown forb
ZZGRASS	Unknown grass	Unknown grass
LITTER2	Woody litter (>1" dia.)	Woody litter (>1" dia.)

Table 21. Ecological Sites

Site number	Site name (plant name)
172Xy100AK	Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)
172Xy101AK	Loamy high flood plains (White spruce/willow open forest)
172Xy102AK	Loamy high flood plains, frozen (White spruce/thinleaf alder open forest)
172Xy103AK	Stream terraces, frozen (Spruce/spruce muskeg sedge open forest)
172Xy104AK	Stream terraces (Spruce/shrub birch woodland)
172Xy105AK	Terraces, wet (Black spruce/closed sheath cottongrass woodland)
172Xy106AK	Glaciolacustrine uplands (Spruce/shrub birch woodland)
172Xy107AK	Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)
172Xy108AK	Gravelly and sandy terraces (Spruce/lichen woodland)
172Xy109AK	Mountain slopes, shallow (Spruce/shrub birch woodland)
172Xy110AK	Glaciolacustrine uplands, ruptic (Spruce/shrub birch woodland)
172Xy111AK	Peat mounds (Spruce/shrub birch woodland)
172Xy200AK	Gravelly flood plains, moderately wet (Low willow/herb scrub)
172Xy201AK	Loamy flood plains, moderately wet (Low willow/herb scrub)
172Xy202AK	Shallow drainages (Low shrub birch-willow/water sedge scrub)
172Xy203AK	Upper mountain slopes, shallow (Low shrub birch scrub)
172Xy204AK	Gravelly and sandy hills (Low shrub birch/lichen scrub)
172Xy205AK	Loamy flood plains, wet (Low willow/water sedge scrub)
172Xy500AK	Loamy riverbanks (Sedge-grass riparian meadow)
172XY501AK	Wet depressions (Sedge wet meadow)
172Xy800AK	Escarpments
172Xy801AK	Loamy backslopes

Table 22. Soil Components of Ecological Sites

Site number – Name (Potential natural plant community)	Soil name
172Xy100AK - Loamy flood plains (Balsam poplar-white spruce/thinleaf alder open forest)	Dackey Kluna, deep Kluna, frequently flooded Klute, moderately wet
172Xy101AK - Loamy high flood plains (White spruce/willow open forest)	Hogan, cool Kluna Klute Klute, occasionally flooded Tangoe, occasionally flooded
172Xy102AK - Loamy high flood plains, frozen (White spruce/thinleaf alder open forest)	Hogan
172Xy103AK - Stream terraces, frozen (Spruce/spruce muskeg sedge open forest)	Kuslinad
172Xy104AK - Stream terraces (Spruce/shrub birch woodland)	Ganhona Kusdry Maclaren Sinona
172Xy105AK - Terraces, wet (Black spruce/closed sheath cottongrass woodland)	Cryaquepts, very wet Haggard Klasi, very wet Kuslinad, very wet Mendna, very wet Pergelic Cryohemists
172Xy106AK - Glaciolacustrine uplands (Spruce/shrub birch woodland)	Chelina Gadona Telay
172Xy107AK - Glaciolacustrine uplands, frozen (Spruce/spruce muskeg sedge open forest)	Cryaquepts Klasi Mankomen Mendna
172Xy108AK - Gravelly and sandy terraces (Spruce/lichen woodland)	Chistna Clarena Pippod
172Xy109AK - Mountain slopes, shallow (Spruce/shrub birch woodland)	Cobblank
172Xy110AK - Glaciolacustrine uplands, ruptic (Spruce/shrub birch woodland)	Swillna Swillna, thin surface
172Xy111AK - Peat mounds (Spruce/shrub birch woodland)	Pergelic Cryohemists, dry
172Xy200AK - Gravelly flood plains, moderately wet (Low willow/herb scrub)	Tangoe Tangoe, wet, occasionally flooded
172Xy201AK - Loamy flood plains, moderately wet (Low willow/herb scrub)	Dackey, cool Ogtna Sankluna Swedna
172Xy202AK - Shallow drainages (Low shrub birch-willow/water sedge scrub)	Ewan

Table 22. Soil Components of Ecological Sites (Continued)

Site number - Name (Potential natural plant community)	Soil name
172Xy203AK - Upper mountain slopes, shallow (Low shrub birch scrub)	Cobblank, cool Goodview
172Xy204AK - Gravelly and sandy hills (Low shrub birch/lichen scrub)	Chistna, high elevation Pippod, high elevation
172Xy205AK - Loamy flood plains, wet (Low willow/water sedge scrub)	Hisna Swedna, high elevation Tangoe, wet, frequently flooded
172Xy500AK - Loamy riverbanks (Sedge-grass riparian meadow)	Aquatna Swedna, very poorly drained
172Xy501AK - Wet depressions (Sedge wet meadow)	Cryofibrists Hufman
172Xy800AK - Escarpments	Cryochrepts Cryorthents
172Xy801AK - Loamy backslopes	Nickolna

Part 6—Appendixes

APPENDIX A—MAPPING AND CLASSIFICATION HIERARCHIES

Ecological Mapping Hierarchy

Three levels of ecological mapping were developed during this survey representing the Subsection, Landtype Association, and Landtype levels of the National Hierarchical Framework of Ecological Units (*ECOMAP 1993*). Table 3 illustrates the hierarchy of ecological units for the project area. The Subsection and Landtype Association levels are described in the section "Subsection and Landtype Association Maps." The soil map and soil map units are equivalent to the Landtype level described in the Hierarchy. "Soil map" and "soil map unit" are used in place of Landtype in reference to the Landtype level throughout this survey report. The soil map units are described in the section "Soil Resources."

National Hierarchical Framework of Ecological Units is a "...system for stratifying the Earth into progressively smaller areas of increasingly uniform ecological potentials" (*ECOMAP 1993*). The hierarchy consists of seven levels of ecological units from the Domain, which is the highest and most general level, to the Landtype Phase. A map of the upper four levels (Domain, Division, Province, and Section), developed using a top-down approach of progressively subdividing the land surface into smaller segments, was developed for Alaska by Nowacki and Brock (*1995*). Descriptions and other data for the Section level are included in McNab and Avers (*1994*) and Bailey et al. (*1994*).

For the Gulkana River area, the Subsection, Landtype Association, and Soil Map Unit levels were developed using a bottom-up approach by aggregating detailed units into more generalized units. Soil map units with similar geomorphic and ecological processes, landform and soil complexes, stream types, wetlands, and vegetation complexes were grouped into Landtype Associations. Landtype Associations were grouped into Subsections based on surficial geology and lithology, geomorphic and ecological processes, soils groups, and potential vegetation.

Most soil map units in the Gulkana River area survey are complexes and undifferentiated groups. Complexes and undifferentiated groups are map units consisting of two or more soil components, which are mapped together in a single unit either because of a repeating geographical association or because their use and management are essentially the same (see "Soil Resources" section).

National Hierarchical Framework of Ecological Units provides a basis for assessing resource conditions at multiple scales and levels of information resolution. The Subsection and Landtype Association levels developed during this survey are applicable to area-wide planning, modeling, and management activities. The Soil Map Unit level is applicable to project and management unit and sub-unit planning and modeling.

Ecological Classification Hierarchy

This survey makes use of two levels of ecological classification—ecological site classification and soil classification. An ecological site, which is the more general level of ecological classification, is a basic unit of ecological land classification and represents a type of land with a distinctive combination of potential natural plant communities, soils, landforms, hydrology, climate, and ecological properties and processes. Ecological Sites of the Gulkana River area are described in Appendix F.

Soils are the building blocks of ecological sites. Usually, soils have a more narrowly defined range of morphological, physical, and chemical properties than an ecological site. One or more soils that have similar vegetative and ecological potentials and processes are grouped together to define an ecological site. Soils of the Gulkana River area are described in Appendix D.

Ecological Site Soil Correlation. To effectively build an ecological site classification from the soil classification, a high degree of correlation between soils, vegetation, and ecological potential is necessary. To establish the relationships and maintain correlation, vegetative characteristics and ecological patterns and processes observed in the field are used in conjunction with soil characteristics and other criteria specified in “Soil Taxonomy” and “Keys to Soil Taxonomy” (*Soil Survey Staff 1975; 1996b*). Gulkana River area soils are classified to the series, subgroup, and great group levels (see “Classification of the Soils”). Soil phases (*Soil Survey Staff 1996c*) are defined if the range in properties for a soil is too broad to maintain the correlation with the vegetative and other ecological properties. Phases are applied at any level of the soil classification. When a soil is split into multiple soil phases, phase name modifiers are added to the soil name to identify the phases.

Ecological site 172Xy201AK—Loamy flood plains, moderately wet, is an example of how soils are defined and grouped into an ecological site. Swedna; Dackey, cool; and Sankluna soils formed in stratified sandy and silty alluvium over very gravelly and cobbly alluvium, on nearly level flood plains. Terrace height typically is from 1.5 to 4 feet (0.5 to 1.2 m) above the river channel, and the seasonally high water table during the growing season is 0.5 to 4 feet (0.2 to 1.3 m) below the surface.

The primary difference between these three soils is the thickness of the stratified sandy and silty layer over the gravelly and cobbly substratum. This difference does not affect vegetative and ecological potentials. The latest successional stage of vegetation on all three soils is Low willow/herb scrub (vegetation cover types of the Gulkana River area are described in Appendix E). Swedna; Dackey, cool; and Sankluna soils, as a group, form ecological site Loamy flood plains, moderately wet.

The three phases of the Swedna series illustrate the concept and use of soil phases. Swedna soils formed in stratified sandy and silty alluvium over gravelly alluvium on low flood plains between 1,850 and 2,900 feet (564 and 884 m) elevation. The first (unnamed) phase of Swedna soils is on terraces from 1.5 to 4 feet (0.5 to 1.2 m) above the river channel, has a seasonally high water table during the growing season at 0.5 to 1.5 feet (0.15 to 0.5 m) below the surface, and in most places supports Low willow/herb scrub vegetation. Scattered *Picea glauca* seedlings, saplings, and occasional small trees are in many stands. This phase is referred to simply as Swedna soils, without any phase name modifier, and is included as part of ecological site 172Xy201AK—Loamy flood plains, moderately wet.

The high elevation phase of Swedna soils is on terraces 0.5 to 3 feet (0.15 to 0.9 m) above the river channel, has a seasonally high water table during the growing season at 0.5 to 1.5 feet (0.15 to 0.5 m) below the surface, and supports Low willow/water sedge

scrub vegetation. These soils are ponded following spring snowmelt and during periods of high stream flow and are generally too wet for tree growth. Swedna, high elevation, soils are included as part of ecological site 172Xy205AK—Loamy flood plains, wet.

The third phase of Swedna soils, Swedna, very poorly drained, occurs primarily as a narrow strip immediately adjacent to the river channel on terraces less than 1.5 feet (less than 0.5 m) above the river channel. These soils have a seasonally high water table throughout much of the growing season at 0 to 0.5 feet (0 to 0.15 m) below the surface and support Sedge-grass riparian meadow vegetation. Swedna, very poorly drained, soils are included in ecological site 172Xy500AK—Loamy riverbanks.

While all three phases of the Swedna series have a similar sequence and morphology of soil horizons, other site and soil properties result in different vegetative and ecological properties and potentials. Phase distinctions maintain the one-to-one correlation with ecological sites.

Relationship Between Ecological Classifications and Mapping

As previously noted, three levels of ecological mapping—Subsections, Landtype Associations, and Soil Map Units—were developed during this survey.   Subsections represent aggregations of Landtype Associations, which are aggregations of Soil Map Units. The soils themselves are components or building blocks of the Soil Map Units. A Soil Map Unit represents an area on the landscape and consists of one or more soils or miscellaneous areas (see “Soil Resources” section). For example, soil map unit FP2—Dackey, cool-Swedna-Swedna, very poorly drained, complex, 0 to 8 percent slopes, represents a segment of the landscape made up of a mosaic of three dominant soils. The proportion of each soil, where it occurs within the unit, and other characteristics of the unit are described in the map unit description.

Because each soil phase is correlated to an ecological site, an ecological site map can be derived from the soils map. In soil map unit FP2, Dackey, cool, and Swedna soils are included in ecological site 172Xy201AK—Loamy flood plains, moderately wet. Swedna, very poorly drained, soils are correlated with ecological site 172Xy500AK—Loamy riverbanks. In an ecological site map, soil map unit FP2 would be included in an ecological site map unit named Loamy flood plains, moderately wet-Loamy riverbanks complex, 0 to 8 percent slopes.

A derived ecological site map would result in a number of instances where more than one soil map unit would be combined into a single ecological site map unit. For example, Pippod, Clarena, and Chistna soils are correlated to ecological site Gravelly and sandy terraces. As a result, soil map units AF1—Pippod-Clarena complex, 2 to 10 percent slopes, and AT1—Chistna and Pippod soils, 0 to 14 percent slopes, are combined in the same ecological site map unit, Gravelly and sandy terraces. A derived ecological site map would fall somewhere between the Soil Map Unit and Landtype Association levels of the ecological mapping hierarchy.

Vegetation Classification and Mapping

Vegetation cover types are a basic unit of vegetation classification based only on the structure and species composition of the existing vegetation cover. No specific ecological relationship or status is incorporated into the cover type classification. As such, vegetation cover types and the vegetation map are not elements of the ecological classifications and mapping.

Criteria established in The Alaska Vegetation Classification (*Viereck et al. 1992*) provides selected general breaks between cover types. The final classification for the Gulkana River area is based on ranges in characteristics and natural breaks observed in the field and established by the field data. The vegetation cover types of the Gulkana River area are described in Appendix E.

In the ecological site descriptions (Appendix F), one vegetation cover type is identified as the baseline potential natural plant community (PNC) for the site. Other vegetation cover types on each site also are identified.

The vegetation map was developed independently of the ecological mapping. Vegetation map units are similar to the soil map units in that each represents a segment of the landscape and is composed of one or more dominant vegetation cover types. Detailed descriptions of vegetation map units are included in the section "Vegetation Resources".

Because of the natural correlation between the vegetation and soils, the location of vegetation map unit boundaries in many places is closely coincident with soil map unit boundaries. Because both vegetation and soils are natural phenomena and have the characteristic variability of all natural phenomena, consistent, coincident breaks between vegetation features and soils features seldom occur in nature. No adjustments were made in line placements for the sake of coincidence.

APPENDIX B—DISCUSSION OF SOIL AND GEOMORPHIC PROCESSES

Soil is the unconsolidated mineral and organic material on the surface of the earth that serves as the natural medium for the growth of land plants (*Soil Survey Division Staff 1993*). Because soil has been subjected to and influenced by numerous weathering processes, it differs from the material from which it was derived in many physical, chemical, and morphological properties and characteristics. Environmental factors such as climate, topography, parent material, and living organisms, all acting over time, influence soil and geomorphic processes. The influence of any one of these factors and resulting processes varies from place to place, but the interaction of all of them determines the kind of soil that forms. The exact combination of physiochemical and biological reactions that transforms materials into the soil horizons of a specific soil can not be determined with certainty. However, many useful generalizations have guided the efforts to organize the available knowledge of soils. Combinations of elementary processes occur in the development of soils. These processes are described on the following pages by Subsection (see Subsection and Landtype Association Maps in Volume 2 for geographic reference).

Gulkana River Flood Plains and Stream Terraces Subsection

This Subsection includes the gently sloping flood plains, stream terraces, and associated oxbow lakes, backswamps, levees, and point bars adjacent to the Gulkana River. Alluvial fans and fan terraces emerging from the uplands into the river corridor also are included in this Subsection. Soils formed in sandy and gravelly alluvium mantled by loamy alluvium of variable thickness. On fan terraces, these deposits are capped with a thin layer of loess. Permafrost is generally absent on low to mid level flood plains and discontinuous on high flood plains and stream terraces. Potential vegetation is willow (*Salix spp*.) and alder (*Alnus spp*.) shrub on low flood plains, productive white spruce (*Picea glauca*) forest on high flood plains, and moderate to low productive spruce (*Picea spp*.) woodland on terraces and fans.

Flood plains:

Fluvial processes, hydromorphism, alkalinization and *acidification* are processes that occur on flood plains.

Fluvial processes include erosion, transportation, and deposition of alluvium by water. Stream velocity, or gradient, and flow volume determine the degree of importance of each process along a particular river reach. Historic and contemporary fluvial processes establish the character of a river valley including degree of entrenchment, valley width, stream gradient and sinuosity. Thornbury (*1969*), Ruhe (*1975*), and others describe in detail general river valley characteristics associated with fluvial processes. On flood plains along low gradient, meandering reaches of the Gulkana River, low velocity floodwaters deposit thick stratified layers of silty and sandy alluvium as over-bank deposits (Figure 6). On high gradient and straighter reaches, high velocity floodwaters deposit gravelly and cobbly alluvium as channel deposits (Figure 3). Surface evidence of fluvial processes along the Gulkana River includes the presence of barren or sparsely vegetated gravel bars, channels, and alluvial flats adjacent to active river channels, as well as debris and water marks on vegetation. Vegetation indicators of fluvial disturbance include the presence of young stands of willow (*Salix spp*.) and alder (*Alnus spp*.) shrub-balsam

poplar (*Populus balsamifera*) forest types adjacent to stream channels (Plate 5—lower photo). Soil indicators include stratification of coarse and fine texture sediments and buried organic layers (Plate 11—lower photo).

Hydromorphism is a key process occurring in soils with near-surface water tables. Landscape features associated with this process include oxbows, cutoff meanders, and river margins. Hydromorphism includes the chemical reduction, mobilization, and movement of soluble minerals under saturated conditions. Local water tables that underlay valley bottoms and connect with the riverine system create saturated soil conditions (Figures 1, 2, 3, 4, 5, 6, 7, and 9). Plant roots and soil microbes deplete the soil oxygen in these saturated mineral soils, causing anaerobic conditions. Subsequently, iron and manganese, the primary pigments in soils, are converted to reduced forms. These reduced compounds are mobile in the soil solution and are easily stripped from the soil by the water table. Soils stripped of mineral pigments in this way take on a neutral gray through bluish color (Plate 6—upper photo). Soil morphological features indicative of this process are described as the “Cg” horizon in Swedna soils (see “Description of the Soils”). Mobilized minerals are transported through the soil by way of ground water to an oxidized zone. Here, mineral oxidation and precipitation occur, imparting a yellowish through reddish color to the soil. Where the water table fluctuates near the surface, the soil environment commonly alternates between reduced and oxidized states, and soils frequently display a complex mottled pattern of both reddish-oxidized and grayish-reduced colors. Soil morphological features indicative of this zone are described as the “ACg” horizon in the surface layer of Aquatna soils (see “Description of the Soils”). Thick organic deposits characteristic of permanently saturated soils in oxbows and cutoff meanders also indicate active hydromorphic processes (Plate 10—upper photo). The accumulation and stability of organic deposits in these soils is attributed to prolonged saturation and the associated anaerobic environment. Thick organic horizons are described as “Oi1” and “Oi2” horizons in Hufman soils (see “Description of the Soils”).

Alkalinization is a key process in frequently flooded soils on low flood plains, and includes the saturation or accumulation of basic soil metals such as calcium, magnesium, potassium, and sodium in surface soil layers. This process includes both the deposition of base rich sediments by flooding and the concentration of bases in the upper soil profile by upward diffusion of base-rich water from a near-surface water table to the drier soil surface during periods of dry, warm weather. Alkalinization affects the accumulation of calcareous calcium and magnesium carbonate compounds. Soils with excessive carbonates effervesce when dilute hydrochloric acid is added. Effervescence is often observed in the upper layers of Aquatna and Swedna soils. In low flood plains soils in the Gulkana River area, soil reaction (pH) of 7.6 or more in surface mineral layers also is a general indication of alkalinization.

Marion, Van Cleve, and Dyrness (*1993*), in studies along the Tanana River in Interior Alaska, observed high levels of calcium carbonate in flood plains soils. A high percentage of the initial carbonate content was attributed to the silt fraction; however, the source area for the carbonate rich alluvium was not determined. Along the Gulkana River, the origin of carbonates in low flood plains soils also appeared to be related to the silt fraction, but the source area was determined to be the calcareous glaciolacustrine deposits extensive in uplands along all tributaries. Movement of carbonate rich alluvium from uplands into the riverine system appears to occur through natural erosion processes and discharge of calcareous ground water, although this has not been documented.

In Aquatna and Swedna soils on low flood plains, further concentration of carbonates in surface soil layers has been observed and is attributed to a combination of hydrologic processes and evapotranspiration. Soil surfaces are readily warmed and surface evaporation is high where there is a lack of an organic mat to shade and insulate the soil surfaces from solar radiation. The dry mineral surface layer promotes upward diffusion of

water from the underlying shallow water table. This process generally occurs during late spring and early summer when long spells of warm, clear weather are common. Sedge-wet meadow vegetation, which is rooted in some of these soils, also removes water from surface layers, further contributing to the moisture gradient and causing additional diffusion of water toward the surface. The combined affect of surface evaporation and plant respiration concentrates carbonate rich materials in the surface layers. Van Cleve, Viereck, and Marion (*1993*) documented similar observations in soils of the Tanana River flood plain near Fairbanks.

Soil *acidification* is a moderately active process on mid to high flood plains in this Subsection. This process includes the removal of excess basic metal cations from the soil through leaching and plant use, and is normally accompanied by a lowering in soil reaction (pH). Organic acids, important weathering agents dissolved from litter, and organic mats contribute to acidification of soils. Evidence of acidification on mid to high flood plains positions includes the presence of a continuous surface organic mat, the absence of free carbonates in surface layers, and soil reaction levels that are more acidic in surface layers than in underlying layers. A gradual increase in soil reaction with depth is shown in the descriptions of Klute, Kluna, and Dackey soils (see “Description of the Soils”).

A variety of site characteristics contribute to acidification in soils on mid to high flood plains. On higher positions, flooding is less frequent. The resulting increase in surface stability favors the development of a continuous surface organic mat that helps lower surface soil temperature and evaporation. Additionally, the increased depth to water table to levels well below the root zone minimizes the upward diffusion of water to the surface. Organic acids produced in the organic mat percolate downward through the mineral soil acidifying the upper soil profile. A significant change in vegetation also occurs on mid to high flood plains. Alder (*Alnus* spp.), a strong soil acidifier (*Crocker and Major 1955*), and white spruce (*Picea glauca*) are more common on mid to high flood plains and contribute to surface acidification of Dackey; Klute, moderately wet; and Kluna, deep, soils.

Permafrost is soil or geologic material that is continuously at or below 0°C (*National Research Council of Canada 1988*). Permafrost is generally absent on low to mid level flood plains throughout this Subsection due to hydrologic factors. The rapid exchange of the relatively warm, mobile waters of the riverine system with the shallow water tables of the riparian system contributes to the lack of permafrost. In addition, mid-summer soil temperatures at 20 inches (51 cm) depth range from 6° to 10°C in Swedna and Dackey soils on low to mid flood plains. Shallow permafrost is not present. The first occurrence of permafrost on flood plains positions in this Subsection is in Hogan soils on high flood plains.

The formation of permafrost depends on a number of factors. Natural stream entrenchment lowers the riverine associated water table and removes a vital warming mechanism from the soil. In addition, natural incision of the stream reduces flooding and provides more stable surface conditions for the establishment of continuous organic mats. Significant areas of soils with shallow permafrost only occur where terrace heights exceed 5 to 12 feet (1.5 to 3.7 m) above the mean summer channel (see Hogan series in “Description of the Soils”).

Permafrost formation also requires the presence of a loamy alluvial mantle 20 inches (51 cm) or more thick. This requisite is explained in terms of soil thermal conductivity properties. Thermal conductivity values quantify how rapidly heat is conducted through soil. These values are relatively low in moist organic materials and moist mineral soils with loamy or finer textures, compared with coarse texture soils (*Jury, Gardner, and Gardner 1991, 180-181*). Low conductivity favors slow warming of soils and overall low summer soil temperatures (0° to 3°C in Hogan soils)—conditions favorable to permafrost formation. In soils formed in coarse texture alluvium, higher thermal conductivity transfers

heat more efficiently from the atmosphere during summer, resulting in rapid warming and relatively high mid summer soil temperatures (4° to 7°C in Sinona soils)—conditions that prevent permafrost formation.

Permafrost in Hogan soils commonly occurs as fine ice crystals between individual soil grains. The overall ice content is low. Sediments show little thermokarst subsidence following disturbance, and melting of the permafrost and cryoturbation are rarely observed. Overlying loamy alluvial sediments are moist but rarely saturated, except immediately above the ice contact.

Stream terraces and alluvial fan terraces:

Stream terraces and fan terraces rarely if ever flood, and processes associated with these relatively stable surfaces differ from the flood plains. The two soil groups recognized on stream terraces are those without permafrost and those with permafrost.

Soils in which permafrost is generally absent formed in sandy and gravelly material. Sinona, Maclaren, Clarena, and Pippod soils represent these conditions. These soils have relatively warm mid summer soil temperatures ranging from 4° to 7°C at 20 inches (51 cm) depth. Major processes associated with these well or somewhat excessively drained soils include *acidification* and *alteration and translocation of soil minerals.* Soil indicators of *acidification* (previously described) include the presence of a continuous surface organic layer, and soil reaction measurably lower in the near-surface mineral layers than subsurface layers (see Sinona and Maclaren soils in "Description of the Soils"). A process associated with more extreme acidification is *alteration and translocation of soil minerals*—the downward percolation of precipitation through permeable soils that mobilizes soil minerals and leaches them down into the soil profile. Indicators of *alteration and translocation* on terraces include a continuous surface organic layer, soil reaction measurably lower in the near-surface mineral layers than subsurface layers, and a yellowish or reddish subsurface mineral layer where mobilized products have accumulated (see the "Bw" horizons in Sinona and Maclaren soils in "Description of the Soils").

Soils with permafrost have thick loamy alluvial mantles, and either have shallow ice-rich permafrost or have been recently burned and lack permafrost (see Kuslinad and Kusdry soils in "Description of the Soils"). The permafrost consists primarily of interstitial ice crystals, filaments, and lenses with only slight or moderate thermokarst subsidence following fire or other surface disturbances. Kuslinad soils, the most extensive permafrost-affected soils in this Subsection, probably cycle between a poorly drained permafrost rich condition and a well drained permafrost free state. Wildfire initiates change by disturbing the insulating organic mat and encouraging melting and subsidence of permafrost and lowering of the associated perched water table. Return to the pre-burn state depends, in part, on the depth of the organic layer consumed by the fire and the rate of revegetation (*Viereck and Dyrness 1979*). The pre-burn state returns as post-fire vegetation succession progresses and the organic mat reestablishes. Dyrness (*1982*) reported that, 4 years after burning in the black spruce type, thaw layer thickness increased 3 fold when one-half of the organic mat was consumed by the fire and 5 fold when the entire surface was consumed and mineral soil exposed. Foote (*1976*) and Viereck (*1973*) agree that, in the black spruce type in Interior Alaska, the forest canopy, forest floor, and active layer thickness return to their original state within 50 to 70 years following fire. Specific soil processes are associated with each part of this cycle.

Abundant nutrients, normally tied up in vegetation, are released to the soil surface following fire. This enrichment, called *alkalinization,* was previously described as it relates to soils on flood plains. On uplands impacted by fire, the origin of nutrients differs significantly. The saturation or accumulation of basic soil metals and nutrients, such as calcium, magnesium, potassium, sodium, and nitrates, in surface soil layers originates from the ash residue left behind after fire. The ash layer typically effervesces when dilute

hydrochloric acid is added; this reaction can often be observed in the remaining surface organic layer of soils for a year or more following fire. Associated with effervescence is a soil reaction (pH) of 8 to 8.2. Other changes in nutrient status following fire, such as improved phosphorus and nitrate status of soils, are usually related to this increase in pH (*Heilman 1966*). Heilman reports that the removal of low-density and low-nitrogen containing layers of moss by fire maximizes nitrogen content of soils at the surface. This restoration of the bulk of the soil nitrogen to the warmest portion of the soil profile explains the substantial improvement in productivity and nitrogen availability following burning.

Acidification is associated with the aerobic, well drained, permafrost free portion of this cycle. As conditions become more acid and organic mats thicken, rates of biological decomposition slow and litter and moss tend to accumulate on the soil surface (see Kusdry series in "Description of the Soils"). Nutrients for plant growth become less available. Thickening of the organic mat is important in terms of nutrient cycling. Without a corresponding increase in the quantity of available nutrients, the quantity of available nutrients in the upper portion of the soil is considerably diminished. As succession proceeds, elements that are at low levels and potentially limited, such as N, P, and K, are cycled by the vegetation and dispersed throughout the increasingly thick organic layer (*Heilman 1966, 1968*). This gradual thickening of the surface organic mat is accompanied by a lowering of soil temperatures in underlying soils. In areas with a loamy alluvial mantle 20 inches (51 cm) or more thick, permafrost may begin to form due to the low thermal conductivity properties associated with the loamy mantle. As previously described, thermal conductivity values quantify how rapidly heat is conducted through soil. These values are relatively low in moist organic materials and moist mineral soils with loamy or finer textures, compared with coarse texture soils (*Jury, Gardner, and Gardner 1991, 180-181*). Low conductivity favors slow warming of soils and overall low summer soil temperatures—conditions favorable to permafrost formation. In soils formed in sandy and gravelly alluvium, higher thermal conductivity transfers heat more efficiently from the atmosphere during summer, resulting in rapid warming and relatively high summer soil temperatures (4° to 8°C in Sinona soils)—conditions that prevent permafrost formation.

With the gradual formation of ice-rich permafrost, downward water movement is impeded. Water collects and saturates the thin unfrozen zone above the permafrost during summer months initiating *hydromorphism* (previously described). Indicators of hydromorphism, including organic accumulation and neutral colors, are described in the respective "O" and "Cg" horizons in Kuslinad soil (see Kuslinad series in "Description of the Soils").

Cryoturbation, the churning of surface and subsoil layers by frost action, is best expressed within the thin, annually thawed zone in soils underlain with permafrost. Indicators of cryoturbation include disrupted and broken soil horizons, mixing of materials from different horizons, and mechanical sorting of materials (*Agriculture Canada Expert Committee on Soil Survey 1987*). Cryoturbation is most evident in soils with abundant soil moisture, high rates of cooling (affected by vegetation and snow cover), and frequent freeze-thaw cycles (*Embleton and King 1968*). Tussocks and hummocks provide surface evidence of cryoturbation in underlying soils. On stream terraces, tussocks in Haggard and Kuslinad, very wet, soils are up to 24 inches (61 cm) high and 18 inches (46 cm) across; and hummocks in Kuslinad soils are up to 24 inches (61 cm) high and 72 inches (183 cm) across. Embleton and King (*1968*) note that ice segregation and differential ground heaving produce tussocks and hummocks. Sigafoos and Hopkins (*1951*) believe that differential freezing initiates the process of hummock formation. Deeper frost penetration in microlow positions causes lateral thrusting or squeezing, often injecting mineral and organic material into or beneath the microhighs, resulting in hummock growth. MacKay (*1980*) provided a flow pattern of hummock growth illustrating the direction of material movement. Fractured soil topography indicative of cryoturbation is described in the "Oe/Cg" horizon in Haggard soils (see "Description of the Soils").

Palsa, or ice mounded topography, occurs to a limited extent on stream terraces (see soil map unit ST2—Kuslinad-Pergelic Cryohemists, dry-Hufman complex, 0 to 1 percent slopes) and is often associated with swarms of small ponds. Palsen are believed to form where permafrost is underlain by an aquifer from which water flows to the ice mound site (*Leffingwell 1919*). As the ice lenses grow, surface organic and mineral materials are pushed upward forming a dome or ridge many feet high (see Pergelic Cryohemists, dry in "Description of the Soils"). Permafrost under palsen consists of large ice masses and lenses. These features are highly susceptible to thermokarst subsidence when disturbed. Soils on these landforms have mid summer soil temperatures that are at or slightly above 0°C at 20 inches (51 cm) depth.

Glaciolacustrine Terraces and Hills Subsection

This Subsection includes the gently sloping to moderately steep glaciolacustrine terraces and hills above the Gulkana River corridor. Soils formed in medium and fine textured glaciolacustrine materials, which were deposited in an extensive proglacial lake that covered much of the Copper River Basin during the late Pleistocene (*Ferrians, Nichols, and Williams 1983*). Loamy lacustrine near-shore deposits are common above 2,000 feet (610 m) elevation. At lower elevations, lacustrine deposits are generally clayey and often calcareous at depth. Coarse textured outwash and strandline deposits and deep organic deposits occur in scattered locations throughout this Subsection. Discontinuous, shallow to moderately deep permafrost is common in clayey and loamy soils and in many areas of organic soils. Permafrost is generally absent in coarse textured soils and in areas impacted by wildfires. Potential vegetation is primarily boreal spruce woodland with wet meadows and scrub in bogs and depressions.

Processes associated with permafrost-affected soils include *acidification, hydromorphism,* and *cryoturbation*. Processes associated with coarse texture soils not influenced by shallow permafrost include *acidification* and *alteration and translocation of soil minerals*.

On the landscapes in this Subsection, permafrost distribution is related to variations in environmental factors such as air temperature, slope, exposure, hydrology, soil parent materials, organic mat thickness, and fire history. Permafrost is discontinuous at higher elevations, above 2,200 feet (671 m)—Loamy Glaciolacustrine Uplands Landtype Association; compared with a more continuous distribution in lower lying areas, below 2,200 feet (671 m) elevation—Clayey Glaciolacustrine Uplands Landtype Association and Ruptic Glaciolacustrine Uplands Landtype Association. During winter, dense, cold, stable air associated with high pressure settles into low-lying areas. Higher elevations remain in warmer air above the inversion (especially the northern part of the Loamy Glaciolacustrine Uplands Landtype Association). In addition, higher winter snow cover insulates soils from radiant heat loss and affects higher winter air and soil temperatures (compare Tables 1 and 2). Mid summer soil temperatures in poorly drained, permafrost rich soils, such as Mendna, are 0°C, or slightly above, at 20 inches (51 cm) depth.

In the loamy Mendna and clayey Klasi soils in this Subsection, permafrost consists of interstitial ice and small ice filaments and lenses. Nichols (*1956*) measured ice content in clayey glaciolacustrine materials in the Glennallen area at 30 to 60 percent of the soil dry weight. Minimal to moderate thermokarst subsidence has been observed in these soils. Permafrost in Swillna and Pergelic Cryohemists, dry, soils consists of interstitial ice, ice filaments, ice lenses, and large ice masses. These soils are highly subject to thermokarst subsidence following disturbance.

Due to wildfire and post fire succession, the extensive Mendna and Klasi soils probably cycle between a poorly drained, permafrost rich condition and well drained, permafrost free state (similar to the Kuslinad soils of the previous Subsection). An explanation of the

various phases of this permafrost cycle; processes associated with each phase, including alkalinization, acidification, hydromorphism, cryoturbation, and nutrient cycling; and an estimated time frame for return to pre-burn conditions are discussed in the Gulkana River Flood Plains and Stream Terraces Subsection. This information applies to this Subsection as well.

Cryoturbation features in this Subsection include tussocks and hummocks (described in the previous Subsection), and frost boils or nonsorted circles. Frost boils are unique features found in the western part of this Subsection. Swillna and Swillna, thin surface, soils formed in frost boils up to 24 inches (61 cm) high and 120 inches (305 cm) across, on landscapes underlain by continuous permafrost. The summits of the boils are usually barren and well drained, and the depressions between boils have thick organic mats and are very poorly drained. Depth to permafrost ranges from shallow to moderately deep and is generally deeper beneath frost boil summits. Soil horizons are fractured and churned, with obvious patches of buried organic materials along the permafrost table contact and scattered lenses of organic matter elsewhere in the mineral matrix. Washburn (*1973*) describes the formation of frost boils or nonsorted circles as a phenomenon caused by the melting of large buried ice lenses (low density) surrounded by a matrix of soil materials (high density). The density gradient causes this bulb of water and surrounding supersaturated soil to rise to the surface, spilling out and forming the frost boil (Plate 7—upper photo and Figure 12). Fractured soil topography indicative of cryoturbation is described in the buried "Oib" and "Oab" horizons in Swillna soils (see section on "Description of the Soils").

Glaciofluvial Plains and Hills Subsection

This Subsection includes the pitted glacial outwash plains and hills in the uplands at the upper end of the Middle Fork and for many miles to the north and west of the survey area (Plate 12—upper photo). Soils formed in a thin layer of silty loess over deep deposits of glacial drift. The glacial drift, which was deposited above 2,600 feet (792 m) elevation by glaciers from surrounding mountains during the Pleistocene, is primarily sandy and gravelly glacial outwash. Permafrost is generally absent. Potential vegetation is primarily shrub birch scrub with willow scrub and sedge-grass meadows in drainages.

Important soil processes in this Subsection include *acidification* and *alteration and translocation of soil minerals.* Soil *acidification* (previously described) is well expressed in Pippod and Chistna soils (see "Description of the Soils"). Extremely acid soil reaction levels (pH of 4.8 or less) in surface layers of Pippod, high elevation, and Chistna, high elevation, soils are among the most acid in the area. Also previously discussed, and well expressed in soils in this Subsection, is *alteration and translocation of soil minerals*. Leaching of minerals from surface layers leaves a thin, bleached, grayish mineral layer represented by the "E/A" horizon in Pippod, high elevation, soil (see "Description of the Soils"). Underlying this gray layer are reddish color zones of mineral accumulation, primarily organic matter, and iron and aluminum oxides represented by the "Bs" horizon. Environmental variables that favor these processes are diverse and include relatively high precipitation, loess surface materials that are readily weathered, uninhibited drainage, and highly permeable coarse texture substratum materials. Warm mid summer soil temperatures, 6° to 10°C at 20 inches (51 cm) depth, initiate relatively high biological activity that also enhances weathering rates in soils.

Permafrost is generally absent in this Subsection due to a variety of climatic, site, and soil characteristics. During winter, dense, cold, stable air associated with high pressure cells settles into low-lying areas while this Subsection remains in warmer air above the inversion. In addition, higher winter snow cover across this Subsection insulates soils from radiant heat loss, causing higher winter air and soil temperatures (compare Tables 1 and 2). The coarse texture materials that make up the majority of the soils in this Subsection also have higher expected

thermal conductivity and diffusivity values than the finer texture soils of the adjacent Subsection (*Jury, Gardner, and Gardner 1991, 180-181*), and thus warm more rapidly during spring and summer. For example, Pippod and Chistna soils in this Subsection have mid summer temperatures that range from 6° to 10°C at 20 inches (51 cm) depth, compared with about 4°C for the well drained loamy Chelina soils of the adjacent Low Mountains Subsection.

Low Mountains Subsection

This Subsection consists of rounded, bedrock cored mountains at mid elevations within the Copper River Basin. At lower elevations, where this Subsection adjoins the Glaciolacustrine Terraces and Hills Subsection, gravelly glacial till and loamy lacustrine near-shore deposits from Pleistocene glaciations mantle most of the landscape. On steeper mountain footslopes, bedrock colluvium and rock outcrops are intermixed in these glacial deposits.

In the Gulkana River area, the Low Mountains Subsection occurs in scattered locations along the lower Middle Fork and upper Main Stem. This Subsection is extensive elsewhere in the Copper River Basin.

Soils formed in silty loess, loamy glaciolacustrine deposits, loamy glacial till, cobbly and gravelly colluvium, and bedrock residuum. Unconsolidated bedrock is very shallow to shallow on upper mountain slopes and very deep on lower slopes. Permafrost is discontinuous and generally confined to lower elevation glaciolacustrine footslopes. Potential vegetation is boreal spruce woodland. Wildfires have burned across most of the middle and upper parts of this Subsection within the Gulkana River area, destroying most of the woodland cover. Potential vegetation at higher elevations includes various subalpine and alpine scrub and dwarf scrub community types.

Processes associated with permafrost-affected soils on lower mountain slopes include *acidification*, *hydromorphism,* and *cryoturbation*. Processes associated with coarse texture soils not influenced by shallow permafrost include *acidification* and *alteration and translocation of soil minerals*.

Lower mountain slopes:
Regional differences in permafrost distribution are related to variations in environmental factors such as air temperature, slope, exposure, hydrology, soil parent materials, organic mat thickness, and fire history. Permafrost is discontinuous within this part of the Subsection, compared with a more continuous distribution in lower lying Subsections of the area. During winter, dense, cold, stable air associated with high pressure cells settles into low-lying areas while this Subsection remains in warmer air above the inversion. Higher winter snow cover insulates soils from radiant heat loss, favoring higher winter air and soil temperatures (compare Tables 1 and 2). Mid summer soil temperatures in poorly drained, permafrost rich soils such as Mendna are 0°C, to slightly above zero, at 20 inches (51 cm) depth.

Wildfire has significant impacts on the presence of shallow permafrost, drainage, and vegetation within this part of the Subsection. Charred stumps and charcoal within the surface organic layers are greater here than in many of the more low-lying Subsections. In areas impacted by fire, permafrost and water tables have been observed to subside; however, soil color patterns, typically associated with hydromorphic processes and cryoturbation, normally persist. Midsummer temperatures in thawed soils such as Chelina range from 4° to 7°C at 20 inches (51 cm) depth—significantly higher than in frozen soils such as Mendna where the range is 0° to 3°C.

Areas of soils formed in loamy lacustrine materials within this part of the Subsection probably cycle between poorly drained, permafrost rich conditions and well drained,

permafrost free states (similar to those of the Glaciolacustrine Terraces and Hills Subsection). An explanation of the various phases of this permafrost cycle; processes associated with each phase, including alkalinization, acidification, hydromorphism, cryoturbation, and nutrient cycling; and an estimated time frame for return to pre-burn conditions are discussed in the Gulkana River Flood Plains and Stream Terraces Subsection. This information applies to this Subsection as well. The lower distribution of soils with permafrost is probably the result of warmer winter air temperatures and higher snow pack, which favor warmer annual soil temperatures.

Upper mountain slopes:

On upper mountain slopes, key processes include *acidification, alteration and translocation of soil minerals*, and *colluvial processes*.

Soil *acidification* is an active process on upper mountain slopes and is described in detail in previous Subsections. Alder (Alnus spp.), a strong soil acidifier, contributes significantly to this process in soils of the subalpine zone (*Crocker and Major 1955*). Alder (*Alnus* spp.) occurs at 2,600 to 2,900 feet (792 to 884 m) elevation on Nickolna soils and contributes to the surface acidification of these soils.

Also previously discussed, and well expressed in soils in this part of the Subsection, is *alteration and translocation of soil minerals*. Leaching of minerals from surface layers leaves a thin, bleached, grayish mineral layer, represented by the “AE” and “A/E” horizons in Telay and Cobblank soils (see section on “Description of the Soils”). Below the surface layers is a yellowish or reddish subsurface layer where mobilized products accumulate, represented by the “2Bw” horizons in both soils.

Colluvial processes are associated with transportation and/or deposition by direct gravitational action, and are primarily limited to steeper slopes within this Subsection. Surface evidence of these processes includes active slumps, active talus, and debris fields interspersed with stable slopes (see Cobblank series in “Description of the Soils”).

APPENDIX C—SURVEY METHODS

The Natural Resources Conservation Service (NRCS) developed inventory objectives and procedures in conjunction with potential users within the Bureau of Land Management (BLM). Color infrared aerial photography, dated July 1989, and orthophoto quads covering the entire survey area were provided by BLM and prepared for field use and mapping. Prior to field work, the photography was studied in detail to determine general soil-landform and soil-vegetation relationships. Relevant literature and other information on the climate, geology, geomorphology, hydrology, and vegetation of the area were assembled and reviewed.

Two levels of mapping intensity were used for both the soils and vegetation maps. The complex of flood plains and stream terraces immediately adjacent to the river channel, which receives the highest intensity of recreational use and provides the most productive and diverse wildlife habitat, was of greatest concern and interest to BLM biologists and land managers. Within this area, minimum polygon size is about 10 acres. Important riparian areas that generally were too narrow to delineate with polygons are shown with labeled line symbols. Approximately 85 percent of the delineations were visited during field work. Delineation boundaries were located from field observation and stereoscopic photo-interpretation. Approximately 22,000 acres (24 percent of the survey area) were mapped at this higher level of intensity.

The remaining 71,000 acres of uplands (76 percent of the area), with a lower intensity of land use and a lesser quality of wildlife habitat, were mapped at a lower level of intensity. In these areas, between six and seven representative delineations of each map unit were visited in the field to determine general characteristics. Polygon boundaries were located using a combination of stereoscopic photo-interpretation and established landform, soil, and vegetation relations. Average polygon size in the uplands is substantially larger and line symbols were used infrequently.

Soils and vegetation field data were collected by transecting tentative soil map units and making observations at predetermined intervals. A transect consisted of one to ten or more stops depending on the size and complexity of the unit. Corresponding soils and vegetation data and notes were linked using common transect and stop numbers. All transect and stop locations were plotted on the aerial photographs and USGS 1:63,360 topographic maps for permanent record and later reference during map preparation and data analysis.

Field data were entered into the Alaska Soil Survey Field Database (SSFDD) for data management and analysis. Results of data analysis were entered into the standard NRCS Map Unit Interpretation Record (MUIR) database.

Soils

Soil survey procedures can be grouped into two categories—map making and field documentation.

The following general steps were used to complete the soils map:

1. Tentative soil map unit boundaries (polygons and line symbols) were drawn on mylar overlays to the aerial photographs using stereoscopic photo interpretation. Landform signatures and vegetation patterns provided a basis for initial boundary locations.

2. This was followed by field evaluation of polygon boundaries during which soils data were collected and tentative assignment of map units made.

3. An office evaluation of the data and review of field notes was completed and followed by adjustment of polygon boundaries and assessment of map unit assignments. A detailed description for each map unit was then prepared identifying the setting and major and minor components in the unit.

4. Soil map unit boundaries were transferred from the color infrared photographs to black and white orthophoto quads. Each polygon and line symbol was labeled with an appropriate symbol identifying the map unit.

Field documentation was collected and recorded on the Alaska Soil Data Form AK-232. This form consists of location, site, and horizon fields. The location field provides geo-reference information for each transect. Included are the legal location of each transect, map unit assignment, field photo number, and 1:63,360 scale quadrangle name. The site data field includes information on landscape properties and soil classification. Some data elements included in this field are slope, aspect, depth to water table, depth to permafrost, and estimated flooding frequency. Soil properties such as soil horizons, texture, rock fragments, and reaction observed at each stop are recorded in the horizon data field. These data provide the basic documentation from which soil map unit descriptions and interpretations are based.

During field work, samples of some of the soils in the area were collected for laboratory analyses and for engineering tests. Laboratory and engineering data, together with the observed soil characteristics and properties, were used to predict the expected behavior of the soils under different land uses. Some interpretations, such as primitive campsites, were modified to meet local needs.

Soil, vegetation, site characteristics, and projected level of management were used as the basis for map units. Soil components within each map unit consist of soils with similar soil properties, site characteristics, and potential vegetation. In valleys, subtle differences in flooding regime, soils, or vegetation are important in terms of riparian management. Map units were setup to account for these slight differences in properties. In uplands, a less diverse set of site, soil, and vegetation characteristics is apparent. Subtle differences in soils often have little effect on management of the unit and a more broadly defined unit is sufficient. Component characteristics are described in the soil map unit descriptions.

Vegetation

Two general categories of vegetation data were collected during field work—ground truth data and stand descriptions. The ground truth data were used to associate photo signatures with vegetation patterns during photo interpretation and mapping and to support vegetation map unit design and composition. Stand descriptions were used to develop the final vegetation cover type and ecological site classifications and descriptions.

Ground truth data consisted primarily of field classification of the vegetation at every transect stop. Field classification was based on the structure and composition of a stand and included a separate call for each major stratum (up to 5 strata) in a stand. The call for a stratum included ADP codes for height class, canopy closure, and dominant species. Tree strata height classes (code) were tall (T1), medium (T2), stunted (TX), and regeneration (T3). Shrub height classes were tall (S2), medium (SM), low (S3), and dwarf (S4). Herbaceous and cryptogam height classes were tall (T), low (L), and dwarf (D). Canopy closure classes were closed (C; 75-100 percent cover), moderately closed (MC; 60-75 percent), moderately open (MO; 45-60 percent), open (O; 25-45 percent), and woodland (W; 10-25 percent). On occasions, canopy closure was coded W- (less than 10

percent) to note the occurrence of minor strata. ADP codes for plant species were taken from the Alaska Plants Database, a subset of PLANTS Database (*U.S. Department of Agriculture 1994*). Lower level strata could include mixed shrub and herbaceous species as stratum dominants. The following are examples of coded multi-strata field classifications.

—T2 MC PICEA | SM MC BEGL | S3 MO LEGR-VAUL | D C MOSS-LICHEN
—T1 C PIGL | S3 C SAPL2 | T O CACA4-FORBS

Detailed stand descriptions were done at one or more selected stops on each transect. Stands were selected subjectively to be representative of the vegetation structure and composition observed along the transect. In most cases, at least one stand of each major type of vegetation on a transect was described. A plotless, reconnaissance technique was used to describe the vegetation. Data were collected within an area of the stand approximately centered on the representative soil pit. Sample area size was variable but encompassed an area large enough to encounter all species in the stand and adequately represent the variability within the stand.

In each sample stand, canopy cover by species of vascular plants and total moss and total lichen cover were estimated to the nearest 5 percent (nearest 1 percent when cover was less than 7 percent). Each species was also assigned to a representative stratum. Unknown species were collected for later possible identification. Cover of persistent and non-persistent litter, bare soil, rock fragments, and ponded water and the approximate height of each major strata also were recorded. In many stands in woodland and forest vegetation, the diameter, age, and total height of selected trees and tree basal area were measured to further characterize the structure and productivity of the stand.

In addition to the ground truth data and stand descriptions, coded entries and notes about fire history, successional status, wildlife use, landscape and successional relationships, variability within and between stands, and unusual communities and inclusions were recorded on each transect.

The major tasks following field work were to develop final vegetation type and ecological site classifications and descriptions, to complete the vegetation map and map unit descriptions, and to develop interpretations for recreation and wildlife habitat. The following general steps were used to develop the final vegetation cover type and ecological site classifications:

1. Stand data were stratified by a combination of field classification of the vegetation; soil, site, and landform properties; and soil map unit. Preliminary association tables for tentative vegetation cover types were generated from the database to verify field classification and establish initial soil, site, and vegetation relationships and patterns.

2. Vegetation classification codes were refined and reassigned, and new association tables generated in a series of iterations, to group stands with the greatest degree of vegetative similarities. Soil, site, and landform properties for each stand included in a cover type were compiled and printed with each successive table to track and define site relationships. Successional relationships between different vegetation types on similar sites were established. Final association tables were then generated for each vegetation cover type.

3. Ecological site codes were assigned to the data and final association tables were generated for the apparent potential natural plant community (PNC), or riparian plant association, and for each successional stage in an ecological site.

4. Frequency of occurrence, average canopy cover, and range in canopy cover for each species were calculated for each vegetation type and PNC. Ranges in soil and site properties were compiled for each ecological site.

5. The final classification of both vegetation types and ecological sites was based on vegetation structure and composition, apparent successional relationships, landscape properties, and potential use and management. A description was prepared for each vegetation cover type and each ecological site.

The following general steps were used to complete the vegetation map:

1. Vegetation map unit delineations (polygons and line symbols) were drawn on mylar overlays to the aerial photographs (field sheets) using stereoscopic photo interpretation. Recurring vegetation signature patterns, ground truth data, and preliminary boundaries identified during field work provided a basis for boundary locations.   Each delineation was assigned to a preliminary map unit.

2. During the course of map preparation, ground truth data were compiled to establish map unit composition and other properties. In a number of instances, two or more preliminary map units were determined to be similar and were combined (correlated) into a single map unit. A map unit description was prepared for each unit on the final legend.

3. Vegetation map unit boundaries and symbols were transferred from the field sheets to black-and-white orthophoto quads using a zoom transfer scope.

APPENDIX D—SOIL SERIES, HIGHER TAXA, AND THEIR MORPHOLOGY

In this section, each soil series recognized in the survey area is described; characteristics of the soil and the material in which it formed are identified; and a pedon, a small three-dimensional area of soil that is typical of the series in the survey area, is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (*Soil Survey Division Staff 1993*). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" and "Keys to Soil Taxonomy" (*Soil Survey Staff 1975; 1996b*). Unless otherwise stated, colors in the descriptions are for moist soil. The range of important characteristics of the soils in the series follows the pedon description.

The map units of each soil series are described in the section "Detailed Soil Map Units".

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*Soil Survey Staff 1975*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field, or inferred from those observations, or from laboratory measurements. The categories are defined in the following paragraphs.

Order. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Inceptisol.

Suborder. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth, or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ochrept (*Ochr*, meaning pale, plus *ept*, from Inceptisol).

Great Group. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Cryaquepts (*Cry*, meaning cold, plus *aquept*, the suborder of the Inceptisols that has an aquic moisture regime).

Subgroup. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Cryaquepts.

Family. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity.

Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, mixed, Typic Cryaquepts.

Series. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

The classification of the soils of the Gulkana River area is given in Table 18.

Descriptions of the Soils

Aquatna Series

(Figure 9)

Taxonomic class: coarse-loamy, mixed, nonacid Typic Cryaquents
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly drained
Permeability: moderate
Position on landscape: flood plains
Parent material: stratified sandy and silty alluvium
Slope range: 0 to 6 percent
Elevation: 2,300 to 2,550 feet (701 to 777 m)
Climatic data (average annual):
precipitation—15 to 19 inches (38 to 48 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Aquatna loam—on a level slope under sedge and bluejoint grass at 2,400 feet (731 m) elevation (all colors for moist soil)

A—0 to 6 inches (0 to 15 cm); dark brown (10YR 3/3) loam; weak fine granular structure; very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; neutral (pH 6.8); clear smooth boundary

ACg—6 to 11 inches (15 to 28 cm); dark brown (10YR 3/3) stratified fine sand through silt with composite texture of fine sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; many large prominent strong brown (7.5YR 4/6) redox concentrations along rhizospheres and throughout the matrix; many very fine, fine, and medium roots; neutral (pH 6.8); gradual smooth boundary

Cg1—11 to 18 inches (28 to 46 cm); dark greenish gray (5GY 4/1) stratified fine sand through silt with composite texture of fine sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; many large prominent dark reddish brown (5YR 3/3) redox concentrations along root margins and throughout the matrix; common very fine and fine roots; neutral (pH 6.8); gradual wavy boundary

Cg2—18 to 51 inches (46 to 130 cm); dark gray (5Y 4/1) stratified fine sand through silt with composite texture of fine sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; few very fine and fine roots; neutral (pH 7.1); slightly effervescent; gradual smooth boundary

Cg3—51 to 60 inches (130 to 152 cm); dark gray (5Y 4/1) stratified fine sand through silt with composite texture of fine sandy loam; weak medium subangular blocky structure;

very friable, nonsticky and nonplastic; few very fine roots; neutral (pH 7.2); slightly effervescent

Typical Pedon Location

Map unit in which located: FP6—Aquatna, frequently flooded-Hogan, cool, complex
Location in survey area: about 12 miles (19 km) north of Sourdough in the SE1/4 of the SW1/4 of sec. 20, T.13N., R.3W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 0 to 1 inch (0 to 3 cm)

A and AC horizons:
Color—hue of 10YR or 2.5Y
Texture—loam, silt loam, and fine sandy loam
Reaction—slightly acid or neutral
Effervescence—none or slight

ACg and Cg horizons:
Color—hue of 2.5Y, 5Y, 5GY, 5G, or 5BG; value moist of 4 or 5; chroma moist of 1 or 2;
occasional pockets and strata of organic materials throughout these horizons—hue of 7.5YR or 10YR, chroma moist of 1 or 2;
common or many redox concentrations present in upper Cg horizons—hue of 7.5YR, 5YR, or 2.5YR, value moist of 3 or 4, chroma moist of 4 through 6
Texture—stratified sand through silt;
occasional pockets and strata of organic materials— texture of muck or mucky peat;
composite texture—fine sandy loam or loam
Reaction—slightly acid to slightly alkaline
Effervescence—none or slight

Chelina Series

(Figure 10)

Taxonomic class: fine-loamy, mixed Typic Cryochrepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: moderate
Position on landscape: broad lacustrine terraces
Parent material: loamy lacustrine deposits
Slope range: 0 to 25 percent
Elevation: 1,900 to 2,950 feet (579 to 899 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Chelina loam—on a 6 percent slope under white spruce forest at 2,250 feet (686 m) elevation (all colors for moist soil)

Oe—1 inch to 0 (3 cm to 0); mucky peat; partially decomposed moss and forest litter; abrupt smooth boundary
ABw—0 to 2 inches (0 to 5 cm); very dark grayish brown (2.5Y 3/2) loam; strong medium granular structure; friable, sticky and plastic; common very fine, fine, and medium

roots; moderately acid (pH 5.8); clear smooth boundary
Bw—2 to 15 inches (5 to 38 cm); dark grayish brown (2.5Y 4/2) loam; moderate coarse subangular blocky structure; friable, sticky and plastic; 5 percent gravel; few very fine and fine roots; neutral (pH 6.6); clear wavy boundary
C1—15 to 18 inches (38 to 46 cm); dark grayish brown (2.5Y 4/2) loam; weak coarse subangular blocky structure; firm, sticky and plastic; 5 percent gravel; slightly alkaline (pH 7.4); gradual wavy boundary
C2—18 to 60 inches (46 to 152 cm); dark grayish brown (2.5Y 4/2) loam; weak coarse subangular blocky structure; firm, sticky and plastic; 5 percent gravel; slightly alkaline (pH 7.6)

Typical Pedon Location

Map unit in which located: LL12—Chelina loam, 0 to 10 percent slopes
Location in survey area: about 12 miles (19 km) northwest of Sourdough in the SE1/4 of the NE1/4 of sec. 1, T.10N., R.3W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 1 to 5 inches (3 to 13 cm)

A and ABw horizons:
Color—hue of 10YR or 2.5Y; value moist of 2 to 4; chroma moist of 1 to 3; color striations common
Texture—silt loam, loam, clay loam, or silty clay loam
Rock fragments—0 to 30 percent gravel and cobbles
Reaction—moderately acid to neutral

Bw horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value moist of 3 to 5; chroma moist of 2 to 4
Texture—silt loam, loam, sandy loam, clay loam, or silty clay loam
Rock fragments—0 to 30 percent (0 to 30 percent gravel, 0 to 10 percent cobbles)
Reaction—moderately acid to neutral

C horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value moist of 4 or 5; chroma moist of 1 or 2
Texture—loam, sandy loam, clay loam, or silty clay loam
Rock fragments—0 to 30 percent (0 to 30 percent gravel, 0 to 10 percent cobbles)
Reaction—slightly acid to mildly alkaline
Effervescence—none to strong

Chistna Series

(Figure 14)

Taxonomic class: sandy, mixed Typic Cryochrepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: somewhat excessively drained
Permeability: in the silty loess mantle—moderate; in the fine sandy loam subsoil—moderately rapid; below this—rapid
Position on landscape: pitted outwash plains, fan terraces, and lacustrine terraces
Parent material: thin loess mantle over sandy glaciofluvial and glaciolacustrine material
Slope range: 0 to 55 percent
Elevation: 1,900 to 3,000 feet (579 to 914 m)

Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Chistna silt loam—on a 3 percent slope under white spruce forest at 2,300 feet (701 m) elevation (all colors for moist soil)

Oi—1 inch to 0 (3 cm to 0); peat; dark reddish brown (5YR 3/3) fibrous roots, moss, and twigs; abrupt wavy boundary
A—0 to 1 inch (0 to 3 cm); very dark grayish brown (10YR 3/2) silt loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; many roots of all sizes; strongly acid (pH 5.4); clear irregular boundary
Bw—1 to 4 inches (3 to 10 cm) strong brown (7.5YR 4/6) and dark reddish brown (5YR 3/4) fine sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; few very fine and fine roots; strongly acid (pH 5.4); clear irregular boundary
2C/2Bw—4 to 9 inches (10 to 23 cm); light olive brown (2.5Y 5/3) and dark yellowish brown (10YR 4/6) loamy fine sand; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; moderately acid (pH 5.8); diffuse irregular boundary
2C1—9 to 18 inches (23 to 46 cm); dark grayish brown (2.5Y 4/2) loamy fine sand; massive; very friable, nonsticky and nonplastic; moderately acid (pH 6.0); gradual wavy boundary
2C2—18 to 60 inches (46 to 152 cm); dark grayish brown (2.5Y 4/2) loamy fine sand; massive grain; very friable, nonsticky and nonplastic; 15 percent subrounded gravel and occasional cobbles; neutral (pH 7.2)

Typical Pedon Location

Map unit in which located: AT1—Chistna and Pippod soils, 0 to 14 percent slopes
Location in survey area: about 11 miles (18 km) northwest of Sourdough in the NW1/4 of the NE1/4 of sec. 6, T.10N., R.2W., Copper River Meridian

Range in Characteristics

Depth to fine sandy loam material: 1 to 7 inches (3 to 18 cm)
Depth to sandy glacial outwash: 3 to 15 inches (8 to 38 cm)
Thickness of solum: 3 to 17 inches (8 to 43 cm)

A horizon (absent in some pedons):
Color—hue of 7.5YR or 10YR; value moist of 2 or 3; chroma moist of 1 to 3
Reaction—strongly or moderately acid

Bw or 2Bw horizon:
Color—hue of 5YR, 7.5YR, or 10YR; value moist of 3 or 4; chroma moist of 3 to 6
Texture—silt loam, fine sandy loam, or sandy loam
Rock fragments—0 to 5 percent gravel
Reaction—strongly or moderately acid

2C horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value moist of 2 to 4; chroma moist of 0 to 3
Rock fragments—0 to 10 percent gravel
Reaction—moderately or slightly acid

Clarena Series

(Figure 8; Plate 1—lower photo)

Taxonomic class: coarse-loamy over sandy or sandy-skeletal, mixed Typic Haplocryods
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty loess mantle and the stratified sand and silt—moderate; below this—rapid
Position on landscape: stream terraces
Parent material: silty loess over stratified sandy and silty alluvium underlain by sandy and gravelly alluvium
Slope range: 0 to 12 percent
Elevation: 2,450 to 2,700 feet (747 to 823 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Clarena silt loam—on a 6 percent slope under white spruce woodland at 2,500 feet (762 m) elevation (all colors for moist soil)

Oi—4 inches to 0 (10 cm to 0); dark reddish brown (5YR 3/3) peat; fibrous moss, roots, and twigs; many roots of all sizes; abrupt wavy boundary
A/Bs—0 to 3 inches (0 to 8 cm); very dark brown (10YR 2/2) with intermittent areas of yellowish red (5YR 5/6) occupying about 40 percent of the horizon; silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many roots of all sizes; very strongly acid (pH 4.7); abrupt irregular boundary
2Bs1—3 to 6 inches (8 to 15 cm); dark reddish brown (5YR 3/4) fine sandy loam; moderate fine subangular blocky structure; very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; strongly acid (pH 5.4); clear smooth boundary
2Bs2—6 to 8 inches (15 to 20 cm); strong brown (7.5YR 4/6) loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; moderately acid (pH 5.6); clear smooth boundary
2E/2Bsb—8 to 12 inches (20 to 30 cm); brown (10YR 4/3) and dark brown (7.5YR 4/4) occupying about 45 percent of the horizon; stratified fine sand through silt with a composite texture of fine sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; moderately acid (pH 6.0); abrupt irregular boundary
2Bsb—12 to 14 inches (30 to 36 cm); strong brown (7.5YR 4/6) stratified fine sand through silt with composite texture of fine sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; few very fine and fine roots; slightly acid (pH 6.2); clear smooth boundary
2BC—14 to 18 inches (36 to 46 cm); dark yellowish brown (10YR 4/4) stratified fine sand through silt; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; few very fine and fine roots; slightly acid (pH 6.2); clear smooth boundary
3C1—18 to 23 inches (46 to 58 cm); dark brown (7.5YR 3/4) very gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 45 percent rounded gravel and 10 percent rounded cobbles; slightly acid (pH 6.2); clear smooth boundary
3C2—23 to 60 inches (58 to 152 cm); variegated extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 45 percent rounded gravel and 15 percent rounded cobbles; neutral (pH 6.6)

Typical Pedon Location

Map unit in which located: AF1—Pippod-Clarena complex, 2 to 10 percent slopes

Location in survey area: about 12 miles (19 km) southwest of Paxson in the NE1/4 of the NW1/4 of sec. 19, T.13N., R.3W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)
Thickness of the loess mantle: 1 to 5 inches (3 to 13 cm)
Depth to sand and gravel: 10 to 31 inches (25 to 79 cm)

A/Bs horizon (absent in many pedons):
A part—Color—value moist of 2 or 3; chroma moist of 1 to 3
Bs part—Color—hue of 2.5YR, 5YR, or 7.5YR; value moist of 3 or 4; chroma moist of 3 to 6
Texture—silt loam or very fine sandy loam
Reaction—very strongly acid to moderately acid

2Bs horizon:
Color—hue of 2.5YR, 5YR, or 7.5YR; value moist of 3 or 4; chroma moist of 3 to 6
Texture—stratified coarse sand, fine sand, sandy loam, and silt loam
Reaction—strongly acid to slightly acid

2E horizon and 2E part of the 2E/2Bs horizon:
Color—hue of 2.5YR, 5YR, or 7.5YR; value moist of 3 or 4; chroma moist of 3 to 6
Reaction—strongly acid to slightly acid

3C horizon:
Color—variegated
Texture—loamy sand, sand, or coarse sand
Rock fragments—40 to 75 percent (35 to 70 percent gravel, 5 to 15 percent cobbles)
Reaction—slightly acid or neutral

Cobblank Series

(Figure 15)

Taxonomic class: loamy-skeletal, mixed Lithic Cryochrepts
Depth class: shallow—10 to 20 inches (25 to 51 cm) over consolidated bedrock
Drainage class: well drained
Permeability: above the bedrock—moderate; below this—impermeable
Position on landscape: hills
Parent material: thin mantle of loess over gravelly glacial till and colluvium underlain by consolidated bedrock
Slope range: 0 to 30 percent
Elevation: 2,300 to 2,800 feet (701 to 853 m)
Climatic data (average annual):
precipitation—18 to 21 inches (46 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Cobblank silt loam—on an 18 percent slope under open white spruce forest and bog birch vegetation at 2,600 feet (792 m) elevation (all colors for moist soil)

Oi—1 inch to 0 (3 cm to 0); dark reddish brown (5YR 3/3) peat; fibrous moss, twigs, and root fibers; abrupt smooth boundary
A/E—0 to 1 inch (0 to 3 cm); dark brown (10YR 3/3) and dark gray (10YR 4/2) silt loam;

weak medium granular structure; very friable, nonsticky and nonplastic; many roots of all sizes; very strongly acid (pH 4.8); abrupt wavy boundary

2Bw1—1 to 4 inches (3 to 10 cm); dark brown (7.5YR 4/4) gravelly sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; 15 percent subangular and subrounded gravel and 5 percent subangular cobbles; strongly acid (pH 5.4); gradual wavy boundary

2Bw2—4 to 10 inches (10 to 25 cm); dark yellowish brown (10YR 4/4) very cobbly sandy loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; few very fine roots; 20 percent subangular and subrounded gravel and 20 percent subangular cobbles; strongly acid (pH 5.4); gradual wavy boundary

2C—10 to 18 inches (25 to 46 cm); dark brown (10YR 4/3) very cobbly sandy loam; massive; friable, nonsticky and nonplastic; 20 percent subangular and subrounded gravel and 20 percent subangular cobbles; moderately acid (pH 5.6); abrupt irregular boundary

3R—18 inches (46 cm); consolidated greenstone bedrock

Typical Pedon Location

Map unit in which located: BR1—Cobblank silt loam, 5 to 25 percent slopes
Location in survey area: about 12 miles (19 km) north of Sourdough in the NE1/4 of the SW1/4 of sec. 27, T.11N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 1 to 5 inches (3 to 13 cm)
Thickness of the loess mantle: 1 to 4 inches (3 to 10 cm)
Thickness of solum: 4 to 8 inches (10 to 21 cm)

A/E or A horizon:
A part—Color—hue of 7.5YR or 10YR; value moist of 2 or 3; chroma moist of 1 to 3
E part—Color—value moist of 4 or 5; chroma moist of 2 or 3
Texture—mucky silt loam, silt loam, or loam
Reaction—very strongly or strongly acid

2Bw horizon:
Color—hue of 7.5YR or 10YR; value moist of 3 or 4; chroma moist of 4 to 6
Texture—loam or sandy loam
Rock fragments—15 to 45 percent (15 to 45 percent gravel, 0 to 30 percent cobbles)
Reaction—strongly to moderately acid

2C horizon:
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 2 or 3
Texture—loam or sandy loam
Rock fragments—35 to 70 percent (25 to 60 percent gravel, 10 to 40 percent cobbles)
Reaction—moderately or slightly acid

Cryaquepts

Taxonomic class: Cryaquepts
Depth class: shallow to very deep—10 to more than 60 inches (25 to more than 152 cm) to permafrost
Drainage class: very poorly or poorly drained
Permeability: variable
Position on landscape: terrace escarpments and toeslopes and footslopes on hills

Parent material: lacustrine loamy, clayey, and sandy deposits; loamy alluvial deposits; and gravelly glacial till deposits
Slope range: 0 to 28 percent
Elevation: 1,850 to 2,850 feet (564 to 869 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Sample Pedon

Cryaquepts—on a 16 percent slope under black spruce forest at 2,400 feet (732 m) elevation (all colors for moist soil)

Oi—4 inches to 0 (10 cm to 0); dark reddish brown (5YR 3/3) peat; many roots of all sizes; abrupt smooth boundary
Cg1—0 to 9 inches (0 to 23 cm); dark gray (5Y 4/1) cobbly silty clay loam; massive; friable, sticky and plastic; common medium faint dark greenish gray (5GY 4/1) redox depletions and common medium distinct dark yellowish brown (10YR 4/4) redox concentrations; 20 percent subangular and rounded cobbles and 20 percent subangular and rounded gravel; few very fine and fine roots; slightly acid (pH 6.4); gradual wavy boundary
Cg2—9 to 31 inches (23 to 79 cm); dark gray (5Y 4/1) clay loam; massive; friable, sticky and plastic; few fine faint (5GY 4/1) redox depletions; 10 percent subangular and rounded gravel; neutral (pH 6.6); gradual wavy boundary
Cg3—31 to 60 inches (79 to 152 cm); dark gray (5Y 4/1) clay loam; massive; friable, sticky and plastic; 10 percent subangular and rounded gravel; neutral (pH 6.6)

Sample Pedon Location

Map unit in which located: TS1—Cryaquepts, 4 to 25 percent slopes
Location in survey area: about 15 miles (24 km) north of Sourdough in the SW1/4 of the NE1/4 of sec. 10, T.11N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 2 to 15 inches (5 to 38 cm)
Depth to permafrost: 7 to more than 60 inches (18 to more than 152 cm) below the mineral soil surface

Ag and ACg horizons (present in many pedons):
Color—hue of 10YR, 2.5Y, 5Y, or 5GY; value moist of 3 or 4; chroma moist of 0 to 2
Texture—loam, clay loam, sandy loam, silt loam, and silty clay loam
Rock fragments—0 to 40 percent (0 to 30 percent subangular or rounded gravel, 0 to 20 percent subangular or rounded cobbles)
Reaction—strongly acid to slightly alkaline

Cg horizon:
Color—hue of 10YR or 2.5Y, 5Y or 5GY; value moist of 2 to 4; chroma moist of 0 to 3
Texture—loam, clay loam, sandy loam, silt loam, silty clay, and silty clay loam
Rock fragments—0 to 40 percent (0 to 30 percent subangular or rounded gravel, 0 to 10 percent subangular or rounded cobbles)
Reaction—moderately acid to slightly alkaline
Other—depleted matrices and/or common to many redox concentrations and depletions; when present,
redox concentrations—hue of 5YR, 7.5YR, or 10YR; chroma moist of 4 to 6;

depleted matrices and redox depletions—hue of 2.5Y, 5Y, 5G, or 5GY; chroma moist of 0 to 2)

C horizon (when present):
Color—hue of 10YR, 2.5Y, or 5Y; value moist of 3 to 5; chroma moist of 1 to 3
Texture—loam, clay loam, sandy loam, silt loam, silty clay, and silty clay loam
Rock fragments—0 to 30 percent (0 to 30 percent subangular or rounded gravel, 0 to 10 percent subangular or rounded cobbles)
Reaction—moderately acid to slightly alkaline

Cryochrepts

Taxonomic class: Cryochrepts
Depth class: deep or very deep—40 to greater than 60 inches (102 to greater than 152 cm) over permafrost
Drainage class: well drained to excessively drained
Permeability: above the permafrost—moderately slow to moderately rapid; in the permafrost—impermeable
Position on landscape: terrace escarpments
Parent material: loamy and clayey lacustrine materials, sandy and gravelly alluvium, loamy and gravelly glacial till, and gravelly and cobbly colluvium
Slope range: 20 to 80 percent
Elevation: 1,850 to 2,900 feet (564 to 884 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Sample Pedon

Cryochrepts—on a 58 percent slope under white spruce forest at 2,300 feet (701 m) elevation (all colors for moist soil)

Oi—1 inch to 0 (3 cm to 0); very dark brown (10YR 2/2) peat; undecomposed moss, twigs, and root fibers; many roots of all sizes; abrupt wavy boundary
A—0 to 1 inch (0 to 3 cm); very dark brown (10YR 2/2) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many roots of all sizes; moderately acid (pH 5.6); clear wavy boundary
Bw—1 to 3 inches (3 to 8 cm); dark brown (7.5YR 3/4) fine sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; moderately acid (pH 5.6); clear wavy boundary
C1—3 to 14 inches (8 to 35 cm); very dark brown (10YR 3/2) fine sand; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; few very fine and fine roots; moderately acid (pH 6.0); gradual wavy boundary
C2—14 to 60 inches (35 to 152 cm); dark grayish brown (2.5Y 5/2) fine sand; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; slightly acid (pH 6.4)

Sample Pedon Location

Map unit in which located: ESC1—Cryorthents and Cryochrepts, 20 to 80 percent slopes
Location in survey area: about 11 miles northwest of Sourdough in the SE1/4 of the SE1/4 of sec. 31, T.11N., R.2W., Copper River Meridian

Range in Characteristics

Mineral surface texture: silt loam, fine sandy loam, or loam
Depth to permafrost: 40 to over 60 inches (102 to over 152 cm)
Subsurface and substratum texture: silt loam, loam, fine sand, sand, sandy loam, clay loam, silty clay loam, silty clay, or clay
Rock fragments: 0 to 40 percent (0 to 40 percent gravel, 0 to 15 percent cobbles)
Reaction: in the solum—strongly to slightly acid; in the substratum—neutral to moderately alkaline

Cryofibrists

(Figures 10, 11, and 13)

Taxonomic class: Cryofibrists
Depth class: very deep—over 60 inches (over 152 cm)
Drainage class: very poorly drained
Permeability: on the organic mat—moderately rapid; in the mineral soil (when present)—moderate or moderately slow
Position on landscape: broad lacustrine terraces
Microtopography: depressions
Parent material: organic materials over loamy and clayey lacustrine deposits and stratified alluvium
Slope range: 0 to 4 percent
Elevation: 1,850 to 2,850 feet (564 to 869 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Sample Pedon

Cryofibrists—on a level slope under ericaceous shrubs and sedges at 2,050 feet (625 m) elevation (all colors for moist soil)

Oi1—0 to 12 inches (0 to 30 cm); dark yellowish brown (10YR 3/4) squeezed peat consisting of undecomposed sedges, roots, and ericaceous shrub fibers; 95 percent fibers unrubbed, 85 percent fibers rubbed; many very fine, fine, and medium roots; slightly acid (pH 6.2); gradual wavy boundary

Oi2—12 to 25 inches (30 to 64 cm); dark brown (10YR 3/3) squeezed peat consisting of undecomposed sedges, roots, and ericaceous shrub fibers; 90 percent fibers unrubbed, 80 percent fibers rubbed; many very fine, fine, and medium roots; slightly acid (pH 6.2); gradual smooth boundary

Oe—25 to 29 inches (64 to 74 cm); black (10YR 2/1) squeezed mucky peat consisting of partially decomposed sedges, roots, and ericaceous shrub fibers; 75 percent fibers unrubbed, 40 percent fibers rubbed; common very fine and fine roots; slightly acid (pH 6.2); abrupt wavy boundary

Cg/Oe—29 to 37 inches (74 to 94 cm); dark greenish gray (5GY 4/1) silty clay and black (10YR 2/1) mucky peat consisting of partially decomposed sedges, roots, and ericaceous shrub fibers; 70 percent fibers unrubbed, 40 percent fibers rubbed; massive; friable, very sticky and very plastic; depleted matrix; neutral (pH 6.8); abrupt smooth boundary

Cg—37 to 60 inches (94 to 152 cm); dark greenish gray (5GY 4/1) clay; massive; friable, very sticky and very plastic; depleted matrix; neutral (pH 6.8)

Sample Pedon Location

Map unit in which located: MK2—Pergelic Cryohemists and Cryofibrists
Location in survey area: about 5 miles (8 km) northwest of Sourdough in the SE1/4 of the SE1/4 of sec. 4, T.9N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 16 to over 60 inches (41 to over 152 cm)

O horizon:
Color—hue of 5YR, 7.5YR, or 10YR; value moist of 2 to 4; chroma moist of 1 to 6
Reaction—very strongly acid to neutral

Cg horizon (when present):
Color—hue of 10YR, 2.5Y, 5Y, 5GY, or 5G; value moist of 2 to 4; chroma moist of 1 to 4
Texture—fine sandy loam, loam, clay, silty clay, silty clay loam, or clay loam
Rock fragments—0 to 20 percent cobbles and gravel
Reaction—slightly acid to moderately alkaline

Cryorthents

Taxonomic class: Cryorthents
Depth class: shallow to very deep—11 to more than 60 inches (28 to more than 152 cm) over permafrost
Drainage class: well drained to excessively drained
Permeability: moderately slow to rapid
Position on landscape: escarpments
Parent material: gravelly alluvium, loamy and clayey lacustrine material, or loamy glacial till
Slope range: 20 to 80 percent
Elevation: 1,850 to 2,900 feet (564 to 884 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Sample Pedon

Cryorthents—on a 23 percent slope under black spruce forest at 2,050 feet (625 m) elevation (all colors for moist soil)

Oi—3 inches to 0 (8 cm to 0); dark reddish brown (5YR 3/2) peat; fibrous litter, roots, and moss; abrupt wavy boundary
A—0 to 1 inch (0 to 3 cm); dark brown (10YR 3/3) silt loam; strong fine subangular blocky structure; very friable, nonsticky and nonplastic; common very fine and fine roots; slightly acid (pH 6.4); gradual wavy boundary
C1—1 to 8 inches (3 to 20 cm); dark grayish brown (2.5Y 4/2) clay loam; strong fine subangular blocky structure; firm, sticky and plastic; 10 percent subangular gravel; few very fine and fine roots; neutral (pH 6.8); gradual wavy boundary
C2—8 to 29 inches (20 to 74 cm); dark grayish brown (2.5Y 4/2) clay loam; massive; firm, sticky and plastic; 10 percent subangular gravel; mildly alkaline (pH 7.6); gradual wavy boundary
C3—29 to 60 inches (74 to 152 cm); dark grayish brown (2.5Y 4/2) gravelly sandy clay loam; strong fine subangular blocky structure; firm, sticky and plastic; 20 percent subangular gravel; mildly alkaline (pH 7.8)

Sample Pedon Location

Map unit in which located: ESC1—Cryorthents and Cryochrepts, 20 to 80 percent slopes
Location in survey area: about 6 miles (10 km) northwest of Sourdough in the SE1/4 of the SW1/4 of sec. 29, T.10N., R.2E., Copper River Meridian

Range in Characteristics

Surface mineral texture: silt loam, fine sandy loam, or loam
Depth to permafrost: 11 to over 60 inches (28 to over 152 cm)
Substratum texture: sand, sandy loam, loam, silt loam, clay loam, silty clay loam, or clay
Rock fragments: 0 to 60 percent (0 to 60 percent gravel, 0 to 15 percent cobbles)
Reaction: moderately acid to moderately alkaline

Dackey Series

(Figure 5)

Taxonomic class: coarse-loamy over sandy or sandy-skeletal, mixed, nonacid Oxyaquic Cryofluvents
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the stratified sandy and silty material—moderate; in the sand and gravel—rapid
Position on landscape: flood plains
Parent material: stratified sandy and silty alluvium over gravelly alluvium
Slope range: 0 to 2 percent
Elevation: 1,800 to 2,600 feet (549 to 792 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Dackey fine sandy loam—on a 0 percent slope under white spruce forest at 1,950 feet (594 m) elevation (all colors for moist soil)

AC/Oe—0 to 7 inches (0 to 18 cm); very dark grayish brown (10YR 3/2) fine sandy loam; weak medium platy structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; slightly acid (pH 6.4); gradual smooth boundary

C1—7 to 18 inches (18 to 46 cm); very dark grayish brown (10YR 3/2) stratified sand, fine sand, fine sandy loam, and silt loam with composite texture of sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; few medium distinct dark yellowish brown (10YR 4/4) redox concentrations and dark grayish brown (2.5Y 4/2) redox depletions; common very fine, fine, and medium roots; slightly acid (pH 6.4); clear smooth boundary

C2—18 to 27 inches (46 to 69 cm); dark gray (5Y 4/1) stratified sand, fine sandy loam, and silt loam with composite texture of sandy loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; neutral (pH 6.8); abrupt smooth boundary

2C—27 to 60 inches (69 to 152 cm); variegated extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 50 percent gravel and 15 percent cobbles; neutral (pH 7.0)

Typical Pedon Location

Map unit in which located: FP3—Dackey-Klute, moderately wet, complex, occasionally flooded
Location in survey area: about 5 miles (8 km) northwest of Sourdough in the NW1/4 of the SW1/4 of sec. 4, T.9N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 0 to 2 inches (0 to 5 cm)
Depth to sand and gravel: 10 to 40 inches (25 to 102 cm)

AC and AC/O horizons:
AC part—Color—hue of 10YR or 2.5Y; value moist of 2 to 4; chroma moist of 1 to 3
Texture—very fine sandy loam, fine sandy loam, or silt loam
O part—Color—value moist of 2 or 3; chroma moist of 1 or 2
Texture—muck or mucky peat
Reaction—slightly acid to slightly alkaline

C horizon:
Color—hue of 10YR to 5Y; value moist of 3 or 4; chroma moist of 1 to 3;
occasional pockets and strata of organic materials—hue of 7.5YR or 10YR; chroma moist of 1 or 2
Texture—stratified sand through silt with composite texture of fine sandy loam or sandy loam;
occasional pockets and strata of organic materials—texture of muck or mucky peat
Reaction—slightly acid to slightly alkaline
Effervescence—none or slight
Other—redoximorphic features range from none to common; when present,
redox concentrations—hue of 5YR to 10YR, value moist of 3 or 4, chroma moist of 4 to 6;
redox depletions—hue of 2.5Y or 5Y, chroma moist of 1 or 2

2C horizon:
Color—variegated
Texture—sand or coarse sand
Rock fragments—35 to 70 percent (20 to 60 percent gravel, 5 to 30 percent cobbles)
Reaction—neutral to moderately alkaline
Effervescence—none or slight

Ewan Series

Taxonomic class: fine-loamy, mixed, nonacid Typic Cryaquepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly or poorly drained
Permeability: moderate
Position on landscape: lacustrine terraces
Microtopography: small drainages and depressions
Parent material: loamy lacustrine deposits and alluvium
Slope range: 0 to 8 percent
Elevation: 2,200 to 2,900 feet (671 to 884 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Ewan silt loam—on a 4 percent slope under low willow shrub at 2,600 feet (792 m) elevation (all colors for moist soil)

Oi—1 inch to 0 (3 cm to 0); dark yellowish brown (10YR 3/4) peat; many very fine, fine, and medium, and few coarse roots; gradual smooth boundary

Ag—0 to 4 inches (0 to 10 cm); very dark gray (10YR 3/1) silt loam; weak medium subangular blocky structure; very friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; moderately acid (pH 5.8); gradual wavy boundary

Cg1—4 to 22 inches (10 to 56 cm); dark gray (5Y 4/1) loam; weak coarse subangular blocky structure; very friable, slightly sticky and slightly plastic; common large distinct dark greenish gray (5GY 4/1) mottles; 5 percent subangular and rounded gravel; common very fine and fine roots; slightly acid (pH 6.1); gradual wavy boundary

Cg2—22 to 49 inches (56 to 124 cm); dark gray (5Y 4/1) loam; massive; friable, sticky and plastic; many large distinct dark greenish gray (5GY 4/1) mottles; 5 percent subangular and rounded gravel; neutral (pH 6.8); gradual wavy boundary

Cg3—49 to 60 inches (124 to 152 cm); dark greenish gray (5GY 4/1 and 5G 4/1) gravelly clay loam; massive; friable, sticky and plastic; 15 percent subangular and rounded gravel; neutral (pH 6.8)

Typical Pedon Location

Map unit in which located: LL2—Mendna-Ewan complex, 0 to 6 percent slopes

Location in survey area: about 21 miles (34 km) north of Sourdough in the NE1/4 of the NW1/4 of sec. 8, T.12N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 1 to 6 inches (3 to 15 cm)

Ag and ACg horizons:

Color—hue of 10YR, 2.5Y, 5Y, or 5GY; value moist of 3 or 4; chroma moist of 0 to 2

Texture—loam, silt loam, or silty clay loam

Rock fragments—0 to 20 percent (0 to 15 percent subangular or rounded gravel, 0 to 10 percent subangular or rounded cobbles)

Reaction—moderately acid to neutral

Cg horizon:

Color—hue of 10YR or 2.5Y, 5Y, or 5GY; value moist of 2 to 4; chroma moist of 0 to 3

Texture—silt loam, loam, silty clay loam, and sandy clay loam with strata of fine sand and sand common

Rock fragments—0 to 20 percent (0 to 15 percent subangular or rounded gravel, 0 to 10 percent subangular or rounded cobbles)

Reaction—moderately acid to neutral

Other—depleted matrix and/or common or many mottles; when present, oxidation mottles—hue of 5YR, 7.5YR, or 10YR; chroma moist of 4 to 6; reduction mottles—hue of 2.5Y, 5Y, 5G, or 5GY; chroma moist of 0 to 2

C horizon (when present):

Color—hue of 10YR, 2.5Y, or 5Y; value moist of 3 to 5; chroma moist of 1 or 2

Texture—silt loam, loam, silty clay loam, and sandy clay loam with strata of fine sand and sand common

Rock fragments—0 to 20 percent (0 to 15 percent subangular or rounded gravel, 0 to 10 percent subangular or rounded cobbles)

Reaction—moderately acid to neutral

Gadona Series

Taxonomic class: fine, mixed Typic Cryochrepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: moderate
Position on landscape: broad lacustrine terraces
Parent material: clayey lacustrine deposits
Slope range: 0 to 25 percent
Elevation: 2,000 to 2,650 feet (610 to 808 m)
Climatic data (average annual):
precipitation—15 to 19 inches (38 to 48 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Gadona silty clay—on a 7 percent slope under white spruce forest at 2,475 feet (754 m) elevation (all colors for moist soil)

Oi—1 inch to 0 (3 cm to 0); peat; undecomposed mat of moss, roots, leaves, and other litter; abrupt smooth boundary

Bw1—0 to 11 inches (0 to 28 cm); dark grayish brown (2.5Y 4/2) silty clay; strong coarse granular structure; friable, very sticky and very plastic; few fine distinct dark greenish gray (5GY 4/1) redox depletions and few fine distinct dark yellowish brown (10YR 4/4) redox concentrations; few very fine and fine roots; moderately acid (pH 6.0); clear smooth boundary

Bw2—11 to 43 inches (28 to 109 cm); dark grayish brown (2.5Y 4/2) silty clay; strong coarse granular structure; friable, very sticky and very plastic; slightly acid (pH 6.4); gradual smooth boundary

C—43 to 60 inches (109 to 152 cm); dark grayish brown (2.5Y 4/2) silty clay; strong fine subangular blocky structure; friable, very sticky and very plastic; slightly effervescent, increasing with depth; mildly alkaline (pH 7.6)

Typical Pedon Location

Map unit in which located: LC2—Gadona silty clay, 0 to 10 percent slopes
Location in survey area: about 16 miles (26 km) north of Sourdough in the NW1/4 of the NE1/4 of sec. 4, T.11N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of organic mat: 1 to 5 inches (2 to 13 cm)
Reaction: moderately acid to moderately alkaline

A or AC horizon (when present):
Color—hue of 10YR, 2.5Y, or 5Y; value moist of 2 to 4; chroma moist of 2 or 3—colors often occurring in horizontal and convoluted streaks and patches
Texture—silty clay loam, silty clay, or clay loam
Reaction—moderately acid or slightly acid

Bw horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value moist of 3 to 5; chroma moist of 1 or 2
Texture—silty clay loam, silty clay, or clay loam
Rock fragments—0 to 10 percent gravel and cobbles
Reaction—moderately acid to neutral
Other—strong granular or strong blocky structure

C horizon:
Color—hue of 2.5Y or 5Y; value moist of 4 or 5; chroma moist of 1 or 2
Texture—silty clay loam, silty clay, or clay loam
Rock fragments—0 to 15 percent (0 to 15 percent gravel, 0 to 10 percent cobbles)
Reaction—slightly acid to moderately alkaline
Effervescence—none or slight

Ganhona Series

(Figure 7)

Taxonomic class: coarse-loamy, mixed Typic Cryochrepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: moderate
Position on landscape: stream terraces
Parent material: silty loess over stratified sandy and silty alluvium
Slope range: 0 to 25 percent
Elevation: 2,300 to 2,600 feet (701 to 793 m)
Climatic data (average annual):
precipitation—15 to 19 inches (38 to 48 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Ganhona silt loam—on a 15 percent slope under white spruce woodland at 2,475 feet (747 m) elevation (all colors for moist soil)

Oi—7 inches to 0 inch (18 cm to 0); very dark brown (10YR 2/2) peat; fibrous moss, roots, and twigs; many roots of all sizes; abrupt wavy boundary
Bw—0 to 2 inches (0 to 5 cm); dark reddish brown (5YR 4/4) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; strongly acid (pH 5.5); abrupt irregular boundary
2C1—2 to 7 inches (5 to 18 cm); dark brown (10YR 3/3) fine sandy loam; moderate medium platy structure; very friable, nonsticky and nonplastic; many very fine and fine roots; moderately acid (pH 5.9); gradual wavy boundary
2C2—7 to 52 inches (18 to 132 cm); dark brown (10YR 3/3) stratified sand, fine sand, fine sandy loam, and silt loam with a composite texture of fine sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; slightly acid (pH 6.4); gradual wavy boundary
2C3—52 to 60 inches (132 to 152 cm); dark grayish brown (10YR 4/2) sand; loose, nonsticky and nonplastic; neutral (pH 6.6)

Typical Pedon Location

Map unit in which located: ST22—Kuslinad-Ganhona complex, 0 to 20 percent slopes
Location in survey area: about 13 miles (21 km) southwest of Paxson in the SW1/4 of the NE1/4 of sec. 28, T.13N., R.3W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 2 to 7 inches (5 to 18 cm)
Depth to stratified loamy material: 1 to 3 inches (3 to 8 cm)

A horizon (when present):
Color—value moist of 2 or 3; chroma moist of 1 to 3
Reaction—strongly acid or moderately acid

Bw or 2Bw horizon:
Color—hue of 5YR, 7.5YR, or 10YR; value moist of 3 or 4; chroma moist of 4 to 6
Texture—silt loam, very fine sandy loam, loam, or fine sandy loam
Reaction—strongly acid or moderately acid

2C horizons:
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 1 to 3
Texture—stratified sand, fine sandy loam, and silt loam
Reaction—moderately acid to neutral

Goodview Series

Taxonomic class: loamy, mixed Lithic Cryumbrepts
Depth class: very shallow or shallow—4 to 15 inches (10 to 38 cm) over consolidated bedrock
Drainage class: well drained
Permeability: above the bedrock—moderate; below this—variable
Position on landscape: mountains
Parent material: thin mantle of loess over consolidated bedrock
Slope range: 0 to 70 percent
Elevation: 3,000 to 3,300 feet (914 to 1,006 m)
Climatic data (average annual):
precipitation—18 to 21 inches (46 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Goodview silt loam—on a 32 percent slope under alder and bog birch scrub at 3,250 feet (990 m) elevation (all colors for moist soil)

Oi—5 inches to 0 (13 cm to 0); very dusky red (2.5YR 2.5/2) peat consisting of fibrous moss and alder litter; clear wavy boundary
A1—0 to 4 inches (0 to 10 cm); very dusky red (10R 2.5/2) and dark brown (10YR 3/3) silt loam; weak medium granular structure; very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; moderately acid (pH 6.0); clear wavy boundary
A2—4 to 6 inches (10 to 15 cm); very dusky red (10R 2.5/2) and dark brown (10YR 3/3) silt loam; weak medium granular structure; very friable, nonsticky and nonplastic; many very fine and fine roots; slightly acid (pH 6.2); abrupt wavy boundary
2R—6 inches (15 cm); consolidated metamorphic bedrock

Typical Pedon Location

Map unit in which located: SA3—Goodview-Rock outcrop complex, 20 to 50 percent slopes
Location in survey area: about 15 miles southwest of Paxson in the NE1/4 of the NE1/4 of sec. 4, T.12N., R3W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 3 to 7 inches (8 to 18 cm)
Depth to bedrock: 4 to 15 inches (10 to 38 cm)

Thickness of solum: 4 to 15 inches (10 to 38 cm)

A horizon:
Color—hue of 10R, 2.5YR, 5YR, 7.5YR, or 10YR; value moist of 2 or 3; chroma moist of 1 to 3
Reaction—strongly acid to slightly acid

Haggard Series

Taxonomic class: loamy, mixed Euic Pergelic Cryohemists
Depth class: shallow or moderately deep—11 to 38 inches (28 to 97 cm) to permafrost
Drainage class: very poorly drained
Permeability: in the organic layers—moderately rapid; in the mineral soil—moderate; in the permafrost—impermeable
Position on landscape: stream terraces
Parent material: organic materials over stratified alluvium
Slope range: 0 to 5 percent
Elevation: 1,850 to 2,400 feet (564 to 732 m)
Climatic data (average annual):
precipitation—15 to 19 inches (38 to 48 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Haggard peat—on a 3 percent slope under ericaceous shrub and eriophorum tussocks at 1,900 feet (579 m) elevation (all colors for moist soil)

Oi—0 to 7 inches (0 to 18 cm); dark yellowish brown (10YR 3/4, squeezed) peat; slightly decomposed organic fibers; about 95 percent fibers unrubbed, 90 percent fibers rubbed; many very fine, fine, and medium roots; moderately acid (pH 6.0); abrupt wavy boundary
Oe—7 to 12 inches (18 to 30 cm); black (10YR 2/1, squeezed) mucky peat; partially decomposed organic fibers; about 85 percent fibers unrubbed, 35 percent fibers rubbed; few very fine, fine, and medium roots; slightly acid (pH 6.4); abrupt wavy boundary
Oe/Cg—12 to 20 inches (30 to 50 cm); very dark brown mucky peat and very dark grayish brown (10YR 3/2) loamy fine sand; organic portion has about 85 percent fibers unrubbed, 35 percent fibers rubbed; massive; very friable, nonsticky and nonplastic; slightly acid (pH 6.4); abrupt smooth boundary
Oeb—20 to 24 inches (50 to 61 cm); very dark brown (10YR 2/2) mucky peat; about 85 percent fibers unrubbed, 70 percent fibers rubbed; slightly acid (pH 6.4)
Cgf—24 to 34 inches (61 to 86 cm); dark greenish gray (5GY 4/1) stratified sand, fine sand, and silt loam; neutral (pH 6.8)—frozen on September 13, 1992

Typical Pedon Location

Map unit in which located: ST5—Haggard peat, 0 to 4 percent slopes
Location in survey area: about 2 miles (3 km) northwest of Sourdough in the NW1/4 of the NE1/4 of sec. 23, T.9N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 16 to 34 inches (41 to 86 cm)
Depth to permafrost: 11 to 38 inches (28 to 97 cm) below the organic surface
Reaction: strongly acid to slightly alkaline

O horizon and O part of O/C horizon:
Color—hue of 2.5YR, 5YR, 7.5YR, or 10YR; value moist of 2 or 3; chroma moist of 1 to 6
Reaction—strongly acid to neutral

Cg1 horizon and Cg part of O/Cg horizon (when present):
Color—hue of 2.5Y, 5Y, 5GY, or 5G; value moist of 3 to 5; chroma moist of 1 or 2
Reaction—slightly acid to slightly alkaline

Hisna Series

Taxonomic class: coarse-loamy over sandy or sandy-skeletal, mixed, nonacid Histic Cryaquepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly drained
Permeability: in the stratified sandy and silty material—moderate; in the sand and gravel—rapid
Position on landscape: flood plains
Parent material: organic material over stratified sandy and silty alluvium underlain by gravelly alluvium
Slope range: 0 to 6 percent
Elevation: 2,550 to 2,800 feet (777 to 853 m)
Climatic data (average annual):
precipitation—18 to 21 inches (46 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Hisna peat—on a 1 percent slope under low willow scrub vegetation at 2,800 feet (853 m) elevation (all colors for moist soil)

Oi1—12 to 3 inches (30 to 8 cm); black (10YR 2/2) peat with occasional lenses and strata of very dark grayish brown (10YR 3/2) sand and silt; many very fine, fine, and medium roots; slightly alkaline (pH 7.8); clear smooth boundary
Oi2—3 inches to 0 (8 cm to 0); dark yellowish brown (10YR 3/6) mucky peat; many very fine, fine, and medium roots; slightly alkaline (pH 7.8); clear wavy boundary
Ag—0 to 3 inches (0 to 8 cm); dark greenish gray (5G 4/1 and 5GY 4/1) stratified fine sand through silt with a composite texture of fine sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; moderately alkaline (pH 8.0); slightly effervescent; clear smooth boundary
Cg—3 to 21 inches (8 to 53 cm); dark greenish gray (5GY 4/1) stratified sand through silt with a composite texture of sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine and fine roots; moderately alkaline (pH 8.0); slightly effervescent; abrupt wavy boundary
2Cg—21 to 25 inches (53 to 64 cm); dark greenish gray (5GY 4/1) extremely cobbly coarse sand; single grain; loose, nonsticky and nonplastic; 40 percent rounded gravel and 20 percent rounded cobbles; few very fine and fine roots; moderately alkaline (pH 8.0); slightly effervescent; gradual smooth boundary
2C—25 to 60 inches (64 to 152 cm); variegated extremely cobbly coarse sand; single grain; loose, nonsticky and nonplastic; 40 percent rounded gravel and 20 percent rounded cobbles; moderately alkaline (pH 8.0); slightly effervescent

Typical Pedon Location

Map unit in which located: FP13—Swedna, high elevation-Hisna complex, 0 to 6 percent slopes

Location in survey area: about 21 miles (34 km) southwest of Paxson in the NW1/4 of the SE1/4 of sec. 5, T.13N., R.4W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 7 to 12 inches (18 to 30 cm)
Depth to sand and gravel: 10 to 22 inches (25 to 56 cm)

Ag horizon:
Color—hue of 5Y, 5GY, 5G, or 5BG; value moist of 4 or 5
Texture—stratified silt through sand with a composite texture of fine sandy loam, sandy loam, or loam;
occasional pockets and strata of organic materials—texture of muck or mucky peat
Reaction—neutral to moderately alkaline
Effervescence—none to slight
Other—depleted matrix

Cg horizon:
Color—hue of 5Y, 5GY, 5G or 5BG; value moist of 4 or 5; chroma moist of 1 or 2
Texture—stratified sand through silt with a composite texture of fine sandy loam, sandy loam, or loam
Reaction—neutral to moderately alkaline
Effervescence—none to slight
Other—depleted matrix

2Cg horizon (when present):
Color—hue of 5Y, 5GY, 5G or 5BG; value moist of 4 or 5; chroma moist of 1 or 2
Texture—sand or coarse sand
Rock fragments—35 to 70 percent (35 to 70 percent gravel, 0 to 30 percent cobbles)
Reaction—neutral to moderately alkaline
Effervescence—none to slight
Other—depleted matrix

2C horizon:
Color—variegated
Texture—sand or coarse sand
Rock fragments—35 to 70 percent (35 to 70 percent gravel, 0 to 30 percent cobbles)
Reaction—neutral to moderately alkaline
Effervescence—none to slight
Other—common pockets and strata of sand and silt

Hogan Series

(Figures 4, 6, 7, and 9; Plate 11—lower photo)

Taxonomic class: loamy, mixed, nonacid Pergelic Cryorthents
Depth class: shallow or moderately deep—14 to 37 inches (36 to 94 cm) over permafrost
Drainage class: well drained
Permeability: above the sand and gravel—moderate; in the permafrost—impermeable
Position on landscape: stream terraces
Parent material: stratified sandy and silty alluvium
Slope range: 0 to 8 percent
Elevation: 1,850 to 2,650 feet (564 to 808 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Hogan fine sandy loam—on a level slope under white spruce forest at 1,850 feet (564 m) elevation (all colors for moist soil)

Oi—3 inches to 0 (8 cm to 0); dark brown (10YR 4/3) peat; fibrous moss, roots, and twigs; many roots of all sizes; gradual smooth boundary

AC/Oe—0 to 4 inches (0 to 10 cm); dark brown (10YR 3/3) fine sandy loam and black (10YR 2/1) mucky peat; weak medium granular structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; moderately acid (pH 5.6); abrupt smooth boundary

C/Oa—4 to 9 inches (10 to 23 cm); very dark grayish brown (10YR 3/2) fine sandy loam and black (10YR 2/1) muck; weak medium platy structure; very friable, nonsticky and nonplastic; common very fine and fine roots; slightly acid (pH 6.2); clear smooth boundary

C—9 to 25 inches (23 to 64 cm); dark grayish brown (2.5Y 4/2) and very dark grayish brown (10YR 3/2) stratified sand through silt with composite texture of sandy loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; few fine faint olive brown (2.5YR 4/4) mottles; few very fine and fine roots; neutral (pH 6.6); abrupt smooth boundary

Cf—25 to 35 inches (64 to 89 cm); dark grayish brown (2.5Y 4/2) and very dark grayish brown (10YR 3/2) stratified fine sand through silt with composite texture of fine sandy loam—frozen on August 29, 1992

Typical Pedon Location

Map unit in which located: ST4—Hogan fine sandy loam
Location in survey area: about 2 miles (3 km) northwest of Sourdough in the SW1/4 of the SW1/4 of sec. 14, T.9N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 2 to 9 inches (5 to 23 cm)
Depth to permafrost: 14 to 37 inches (36 to 94 cm)

AC/Oe and C/Oa horizons:
AC or C part—Color—hue of 10YR or 2.5Y; value moist of 2 to 4; chroma moist of 1 to 3
Texture—very fine sandy loam, fine sandy loam, or silt loam
Reaction—moderately acid to neutral

C horizon:
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 1 to 3;
Texture—stratified sand through silt with composite texture of fine sandy loam and sandy loam;
occasional pockets and strata of organic materials—texture of muck or mucky peat
Reaction—slightly acid to slightly alkaline
Effervescence—none to slight
Other—few to common mottles in some pedons; when present,
oxidation mottles—hue of 7.5YR or 10YR; chroma moist of 4 to 6;
reduction mottles—hue of 2.5Y or 5Y; chroma moist of 1 or 2

Hufman

(Plate 10—upper photo)

Taxonomic class: loamy, mixed Euic Terric Cryofibrists

Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly drained
Permeability: in the organic layers—moderately rapid; in the mineral soil—moderate
Position on landscape: stream terraces
Microtopography: cutoff meanders and depressions
Parent material: organic materials over stratified alluvium
Slope range: 0 to 1 percent
Elevation: 1,850 to 2,600 feet (564 to 792 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Cryaquepts—on a level slope under Sedge wet meadow vegetation at 1,900 feet (579 m) elevation (colors for organic layers are for squeezed soils; mineral layer colors are for saturated soil)

Oi1—0 to 9 inches (0 to 23 cm); dark yellowish brown (10YR 3/6, squeezed) fibrous sedge peat; slightly decomposed sedge fibers; about 95 percent fibers unrubbed, 85 percent fibers rubbed; many very fine, fine, and medium roots; slightly acid (pH 6.2); gradual wavy boundary

Oi2—9 to 26 inches (23 to 66 cm); dark yellowish brown (10YR 3/4, squeezed) fibrous sedge peat; slightly decomposed sedge fibers; about 90 percent fibers unrubbed, 80 percent fibers rubbed; many very fine, fine, and medium roots; slightly acid (pH 6.2); abrupt smooth boundary

Cg1—26 to 34 inches (66 to 86 cm); dark greenish gray (5GY 4/1) silt loam; massive; very friable, nonsticky and nonplastic; slightly acid (pH 6.4); gradual wavy boundary

Cg2—34 to 60 inches (86 to 152 cm); dark greenish gray (5GY 4/1) stratified fine sand through silt loam; massive; very friable, nonsticky and nonplastic; slightly acid (pH 6.4)

Typical Pedon Location

Map unit in which located: MK1—Hufman peat
Location in survey area: about 2 miles (3 km) northwest of Sourdough in the SW1/4 of the NE1/4 of sec. 23, T.9N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 16 to 40 inches (41 to 52 cm)
Reaction: strongly acid to neutral

O horizon:
Color—hue of 5YR, 7.5YR, or 10YR; value moist of 2.5 or 3; chroma moist of 3 to 6
Reaction—strongly acid or slightly acid

Cg horizon:
Color—hue of 2.5Y, 5Y, 5GY, or 5G; value moist of 3 to 5; chroma moist of 1 or 2
Reaction—slightly acid or neutral

Klasi Series

(Figure 11; Plate 8—lower photo)

Taxonomic class: clayey, mixed, nonacid Histic Pergelic Cryaquepts
Depth class: shallow to moderately deep—4 to 38 inches (10 to 97 cm) over permafrost

Drainage class: very poorly or poorly drained
Permeability: in the organic mat—moderately rapid; in the mineral soil—moderate; in the permafrost—impermeable
Position on landscape: broad lacustrine terraces
Parent material: clayey lacustrine deposits
Slope range: 0 to 12 percent
Elevation: 1,850 to 2,550 feet (564 to 777 m)
Climatic data (average annual):
precipitation—15 to 19 inches (38 to 48 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Klasi peat—on a 2 percent slope under black spruce forest at 2,050 feet (625 m) elevation (all colors for moist soil)

Oi—8 to 3 inches (20 to 8 cm); very dusky red (2.5YR 2.5/2) peat; slightly decomposed moss and root fibers; abrupt irregular boundary
Oe—3 inches to 0 (8 cm to 0); very dark brown (10YR 2/2) mucky peat; partially decomposed moss and root fibers; abrupt irregular boundary
A—0 to 2 inches (0 to 5 cm); very dark grayish brown (10YR 3/2) silty clay loam; strong very fine granular structure; friable, very sticky and very plastic; many very fine and fine roots; neutral (pH 6.6); clear irregular boundary
C1—2 to 16 inches (5 to 41 cm); dark grayish (2.5YR 4/2) silty clay; strong fine subangular blocky structure; firm, very sticky and very plastic; 5 percent cobbles and 5 percent gravel; neutral (pH 6.8); gradual wavy boundary
C2—16 to 23 inches (41 to 58 cm); dark grayish brown (2.5Y 4/2) clay; strong fine subangular blocky structure; firm, very sticky and very plastic; 5 percent cobbles and 5 percent gravel; mildly alkaline (pH 7.4); abrupt wavy boundary
Cf—23 to 33 inches (58 to 84 cm); dark grayish brown (5Y 4/2) silty clay; mildly alkaline (pH 7.4)—frozen on July 31, 1992

Typical Pedon Location

Map unit in which located: LC1—Klasi peat, 0 to 10 percent slopes
Location in survey area: about 8 miles (13 km) northwest of Sourdough in the SE1/4 of the SW1/4 of sec. 19, T.10N., R.3W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 8 to 16 inches (20 to 41 cm)
Depth to permafrost: 4 to 38 inches (10 to 97 cm) below the mineral surface

O horizon:
Reaction—strongly acid to slightly acid

A or AC horizon:
Color—hue of 10YR or 2.5Y; value moist of 2 or 3; chroma moist of 1 to 3
Texture—silty clay loam, silty clay, or clay
Reaction—slightly acid to slightly alkaline

Cg horizon (absent in many profiles):
Color—hue of 2.5Y, 5Y, or 5GY; chroma moist of 1 or 2
Texture—clay, silty clay, or silty clay loam
Rock fragments—0 to 20 percent (0 to 10 percent cobbles, 0 to 15 percent gravel)

Reaction—slightly acid to slightly alkaline
Other—common pockets and lenses of organic material

C horizon:
Color—hue of 2.5Y or 5Y; value moist of 4 or 5; chroma moist of 1 or 2
Texture—clay, silty clay, or silty clay loam
Rock fragments—0 to 20 percent (0 to 10 percent cobbles, 0 to 15 percent gravel)
Reaction—slightly acid to slightly alkaline
Effervescence: none or slight

Kluna Series

(Figures 4 and 6)

Taxonomic class: coarse-loamy, mixed, nonacid Typic Cryofluvents
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well or moderately well drained
Permeability: in the stratified loamy material—moderate; in the sand and gravel—rapid
Position on landscape: flood plains and low stream terraces
Parent material: stratified sandy and silty alluvium over gravelly alluvium
Slope range: 0 to 7 percent
Elevation: 1,900 to 2,700 feet (579 to 823 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Kluna fine sandy loam—on a 0 percent slope under white spruce forest at 2,450 feet (747 m) elevation (all colors for moist soil)

Oi—2 inches to 0 (5 cm to 0); dark brown (7.5YR 3/4) peat; fibrous moss, roots, and twigs; abrupt smooth boundary
AC—0 to 3 inches (0 to 8 cm); dark brown (10YR 3/3) fine sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; many roots of all sizes; moderately acid (pH 5.6); clear smooth boundary
C1—3 to 14 inches (8 to 36 cm); very dark grayish brown (10YR 3/2) stratified sand through silt with composite texture of sandy loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; few fine faint dark yellowish brown (10YR 4/4) mottles; common very fine, fine, and medium roots; moderately acid (pH 5.6); abrupt smooth boundary
C/Oa—14 to 19 inches (36 to 48 cm); very dark grayish brown (10YR 3/2) stratified sand through silt with composite texture of sandy loam; occasional strata of black (10YR 2/1) mucky peat; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; few fine faint dark yellowish brown (10YR 4/4) mottles; few very fine, fine, and medium roots; moderately acid (pH 6.0); clear smooth boundary
C2—19 to 42 inches (48 to 107 cm); dark grayish brown (10YR 4/2) stratified sand through silt with composite texture of sandy loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; moderately acid (pH 6.0); clear smooth boundary
Cg—42 to 45 inches (107 to 114 cm); dark gray (5Y 4/1) stratified fine sand through silt with composite texture of fine sandy loam; coarse subangular blocky structure; very friable, nonsticky and nonplastic; many medium prominent dark reddish brown (5YR 3/4) mottles; moderately acid (pH 6.0); abrupt smooth boundary
2C—45 to 60 inches (114 to 152 cm); variegated very gravelly coarse sand; single grain; loose, nonsticky and nonplastic; slightly acid (pH 6.2)

Typical Pedon Location

Map unit in which located: ST1—Klute and Kluna soils, 0 to 3 percent slopes
Location in survey area: about 21 miles (32 km) north of Sourdough in the SW1/4 of the SE1/4 of sec. 6, T.12N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)
Depth to sand and gravel: 40 to over 60 inches (102 to over 152 cm)

A or AC horizon (absent in many pedons):
Color—hue of 10YR or 2.5Y; value moist of 2 or 3; chroma moist of 1 to 3
Texture—very fine sandy loam, fine sandy loam, or silt loam
Reaction—moderately acid to slightly alkaline

C and Cg horizons:
Color—hue of 10YR to 5Y; value moist of 3 or 4; chroma moist of 1 to 3;
occasional pockets and strata of organic materials—hue of 7.5YR or 10YR; chroma moist of 1 or 2
Texture—stratified sand through silt with composite texture of fine sandy loam, sandy loam, or loam;
occasional pockets and strata of organic materials—texture of muck or mucky peat
Textures often become coarser with depth, with fine sand, loamy fine sand, and sand textures common in lower horizons.
Reaction—neutral to moderately alkaline
Effervescence—none or slight
Other—common to many mottles in the lower horizons in many pedons; when present,
oxidation mottles—hue of 5YR, 7.5YR, or 10YR; chroma moist of 4 to 6;
reduction mottles—hue of 2.5Y or 5Y; chroma moist of 1 or 2

2C horizon (absent in many pedons):
Color—variegated or hues of 10YR and 2.5Y; value moist of 3 to 5; chroma moist of 1 to 3
Texture—sand or coarse sand
Rock fragments—40 to 75 percent (25 to 65 percent gravel, 0 to 20 percent cobbles)
Reaction—neutral to moderately alkaline
Effervescence—none or slight

Klute Series

(Figures 4, 5, and 8; Plate 5—upper photo)

Taxonomic class: coarse-loamy over sandy or sandy-skeletal, mixed, nonacid Typic Cryofluvents
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: moderately well or well drained
Permeability: above the sand and gravel—moderate; below this—rapid
Position on landscape: flood plains and stream terraces
Parent material: stratified sandy and silty alluvium over sandy and gravelly alluvium
Slope range: 0 to 7 percent
Elevation: 1,800 to 2,700 feet (547 to 823 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Klute fine sandy loam, cool—on a 0 percent slope under white spruce forest at 2,450 feet (747 m) elevation (all colors for moist soil)

Oi—1 inch to 0 (3 cm to 0); black (10YR 2/1) peat; fibrous moss, roots, and twigs; abrupt smooth boundary

C1—0 to 2 inches (0 to 5 cm); dark grayish brown (2.5Y 4/2) very fine sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; moderately acid (pH 5.6); abrupt smooth boundary

Oe/Cb—2 to 5 inches (5 to 13 cm); black (10YR 2/1) and very dark grayish brown (10YR 3/2) mucky peat and fine sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; few common distinct dark yellowish brown (10YR 4/4) mottles; common very fine, fine, and medium roots; moderately acid (pH 5.6); abrupt smooth boundary

C2—5 to 9 inches (13 to 23 cm); very dark grayish brown (10YR 3/2) stratified fine sand through silt with composite texture of fine sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; moderately acid (pH 5.8); gradual smooth boundary

C3—9 to 33 inches (23 to 84 cm); very dark grayish brown (10YR 3/2) stratified fine sand through silt with composite texture of fine sandy loam; moderate thick platy structure; very friable, nonsticky and nonplastic; common medium distinct dark yellowish brown (10YR 4/6) and dark gray (5Y 4/1) mottles; few very fine and fine roots; slightly acid (pH 6.2); abrupt smooth boundary

2C—33 to 60 inches (84 to 152 cm); variegated extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 60 percent gravel; slightly acid (pH 6.8)

Typical Pedon Location

Map unit in which located: ST1—Klute and Kluna soils, 0 to 3 percent slopes

Location in survey area: about 20 miles (32 km) north of Sourdough in the SE1/4 of the SE1/4 of sec. 19, T.12N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 0 to 4 inches (0 to 10 cm)

Depth to sand and gravel: 12 to 40 inches (30 to 102 cm)

A or AC horizon (absent in many pedons):

Color—hue of 10YR or 2.5Y; value moist of 2 to 4; chroma moist of 1 to 3

Texture—very fine sandy loam, fine sandy loam, or silt loam

Reaction—moderately acid to slightly acid

C horizon:

Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 1 to 3;
occasional pockets and strata of organic materials—hue of 7.5YR or 10YR; chroma moist of 1 or 2

Texture—stratified sand through silt with composite texture of sandy loam or fine sandy loam;
occasional pockets and strata of organic materials—texture of muck or mucky peat

Reaction—slightly acid to neutral

Effervescence—none or slight

Other—few to common mottles in some pedons; when present,
oxidation mottles—hue of 7.5YR or 10YR; chroma moist of 4 to 6;
reduction mottles—hue of 2.5Y or 5Y; chroma moist of 1 or 2

2C horizon:
Color—variegated or hues of 10YR and 2.5Y; value moist of 3 to 5; chroma moist of 1 to 3
Texture—sand or coarse sand
Rock fragments—40 to 75 percent (25 to 65 percent gravel, 0 to 20 percent cobbles)
Reaction—neutral to moderately alkaline
Effervescence—none or slight

Kusdry Series

Taxonomic class: coarse-loamy, mixed Aquic Cryochrepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: somewhat poorly drained
Permeability: in the stratified sandy and silty material—moderate; in the sand and gravel—rapid
Position on landscape: stream terraces
Parent material: stratified sandy and silty alluvium over gravelly alluvium
Slope range: 0 to 2 percent
Elevation: 1,950 to 2,250 feet (594 to 686 m)
Climatic data (average annual):
precipitation—15 to 19 inches (38 to 48 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Kusdry sandy loam—on a 2 percent slope under dwarf white and black spruce forest at 1,950 feet (593 m) elevation (all colors for moist soil)

Oi—1 inch to 0 (3 cm to 0); black (10YR 2/2) peat consisting of raw fibrous moss, twigs, and root fibers; clear smooth boundary
Bw1—0 to 2 inches (0 to 5 cm); strong brown (7.5YR 4/6) fine sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; moderately acid (pH 6.0); gradual smooth boundary
Bw2—2 to 6 inches (5 to 15 cm); dark yellowish brown (10YR 4/4) stratified fine sand through silt with composite texture of fine sandy loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; moderately acid (pH 6.0); clear smooth boundary
Cg—6 to 43 inches (15 to 109 cm); dark grayish brown (2.5Y 4/2) and dark gray (5Y 4/1) stratified fine sand through silt with composite texture of fine sandy loam; common medium distinct dark yellowish brown (10YR 4/6) redox concentrations; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; neutral (pH 6.8); gradual smooth boundary
2C—43 to 60 inches (109 to 152 cm); variegated extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 65 percent rounded gravel; neutral (pH 7.2)

Typical Pedon Location

Map unit in which located: ST24B—Kuslinad-Kuslinad, very wet-Kusdry complex
Location in survey area: about 5 miles (8 km) northwest of Sourdough in the NW1/4 of the NE1/4 of sec. 5, T.9N., R.3W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 1 to 5 inches (3 to 13 cm)
Depth to sand and gravel: 40 to 60 inches (102 to 152 cm)

A horizon (when present):
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 1 or 2
Texture—sandy loam, loam, or fine sandy loam
Reaction—moderately acid or slightly acid

Bw horizon:
Color—hue of 7.5YR or 10YR; value moist of 3 or 4; chroma moist of 4 to 6
Texture—stratified sand through silt with composite texture of loam, sandy loam, or fine sandy loam
Reaction—moderately acid or slightly acid
Other—common pockets and strata of organic materials

Cg horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value moist of 4 or 5; chroma moist of 1 or 2
Texture—stratified sand through silt with composite texture of loam, sandy loam, or fine sandy loam
Reaction—neutral or slightly alkaline
Other—redox concentrations—hue of 5YR, 7.5YR, or 10YR; redox depletions—hue of 5Y, 5GY, or 5BG

C horizon (when present):
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 2 or 3
Texture—stratified sand through silt with composite texture of loam, sandy loam, or fine sandy loam
Reaction—neutral or slightly alkaline
Other—effervescence ranges from none to slight

2C horizon:
Color—variegated
Texture—sand or coarse sand
Rock fragments—40 to 70 percent (25 to 60 percent gravel, 0 to 30 percent cobbles)
Reaction—neutral or slightly alkaline
Other—effervescence ranges from none to slight

Kuslinad Series

(Figures 4, 6, 7, and 9)

Taxonomic class: loamy, mixed, nonacid Histic Pergelic Cryaquepts
Depth class: very shallow to moderately deep—4 to 32 inches (10 to 81 cm) over permafrost
Drainage class: very poorly or poorly drained
Permeability: in the organic mat—moderately rapid; in the mineral soil—moderate; in the permafrost—impermeable
Position on landscape: stream terraces
Parent material: stratified sandy and silty alluvium
Slope range: 0 to 6 percent
Elevation: 1,850 to 2,500 feet (564 to 762 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Kuslinad peat—on a level slope under black spruce forest at 1,900 feet (579 m) elevation (all colors for moist soil)

Oi—8 to 4 inches (20 to 10 cm); dark reddish brown (5YR 3/2) peat; raw fibrous moss, twigs, and root fibers; clear smooth boundary

Oe—4 inches to 0 (10 cm to 0); dark reddish brown (5YR 2.5/2) mucky peat; partially decomposed moss, twigs, and root fibers; abrupt wavy boundary

Cg1—0 to 9 inches (0 to 23 cm); very dark grayish brown (10YR 3/2) very fine sandy loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; many large prominent dark greenish gray (5GY 4/1) and dark yellowish brown (10YR 4/4) mottles; common very fine, fine, and medium roots; slightly acid (pH 6.2); gradual wavy boundary

Cg2—9 to 12 inches (23 to 30 cm); very dark grayish brown (10YR 3/2) stratified fine sand, fine sandy loam, and silt loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; common medium distinct dark gray (5Y 4/1) and dark yellowish brown (10YR 4/4) mottles; slightly acid (pH 6.4); abrupt wavy boundary

Cf—12 to 22 inches (30 to 56 cm); very dark grayish brown (10YR 3/2) stratified fine sand, fine sandy loam, and silt loam—frozen on August 2, 1992

Typical Pedon Location

Map unit in which located: ST21—Kuslinad peat

Location in survey area: about 3 miles (5 km) northwest of Sourdough in the NE1/4 of the NE1/4 of sec. 16, T.9N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 8 to 16 inches (20 to 40 cm)

Depth to permafrost: 4 to 35 inches (10 to 89 cm) below the mineral surface

O horizon:

Reaction—strongly acid to moderately acid

A or ACg horizon (absent in many pedons):

Color—value moist of 1 or 2; chroma moist of 2 or 3

Texture—silt loam, very fine sandy loam, or fine sandy loam

Reaction—moderately acid or slightly acid

Cg horizon:

Color—hue of 10YR, 2.5Y, or 5Y; value moist of 3 or 4; chroma moist of 1 or 2

Texture—stratified sand, fine sand, fine sandy loam, and silt loam

Mottles—redox concentrations—hue of 7.5YR or 10YR and chroma moist of 4 to 6; redox depletions—hue of 10YR, 2.5Y, 5Y, or 5GY and chroma moist of 0 to 2

Rock fragments—0 to 5 percent gravel

Reaction—slightly acid or neutral

Maclaren Series

(Figure 5)

Taxonomic class: coarse-loamy over sandy or sandy-skeletal, mixed Typic Cryochrepts

Depth class: very deep—more than 60 inches (more than 152 cm)

Drainage class: well drained

Permeability: above the sand and gravel—moderate; below this—rapid

Position on landscape: stream terraces

Parent material: stratified sandy and silty alluvium over gravelly alluvium

Slope range: 0 to 20 percent

Elevation: 1,950 to 2,450 feet (594 to 747 m)

Climatic data (average annual):
precipitation—15 to 19 inches (38 to 48 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Maclaren silt loam—on a level slope under white spruce forest at 2,250 feet (686 m) elevation (all colors for moist soil)

Oi—3 inches to 0 (8 cm to 0); very dusky red (2.5YR 2.5/2) peat; fibrous moss, roots, and twigs; many roots of all sizes; abrupt smooth boundary

A—0 to 1 inch (0 to 3 cm); dark brown (10YR 3/3) silt loam; weak fine platy structure; very friable, nonsticky and nonplastic; many roots of all sizes; moderately acid (pH 5.6); abrupt wavy boundary

Bw—1 to 4 inches (3 to 10 cm); dark brown (7.5YR 4/4) and strong brown (7.5YR 4/6) loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; moderately acid (pH 5.6); diffuse irregular boundary

Bw/C—4 to 8 inches (10 to 20 cm); dark yellowish brown (10YR 4/4) and very dark grayish brown (10YR 3/2) stratified sand through silt with composite texture of sandy loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; moderately acid (pH 5.8); diffuse irregular boundary

C—8 to 18 inches (20 to 46 cm); very dark grayish brown (10YR 3/2) stratified sand through silt with composite texture of sandy loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; common medium distinct dark yellowish brown (10YR 4/4) mottles; moderately acid (pH 6.0); abrupt wavy boundary

2C—18 to 60 inches (46 to 152 cm); variegated extremely cobbly coarse sand; single grain; loose, nonsticky and nonplastic; 35 percent gravel and 25 percent cobbles; slightly acid (pH 6.4)

Typical Pedon Location

Map unit in which located: ST41—Maclaren-Sinona complex, 0 to 15 percent slopes
Location in survey area: about 12 miles (19 km) northwest of Sourdough in the NW1/4 of the NE1/4 of sec. 32, T.11N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)
Depth to sand and gravel: 10 to 37 inches (25 to 94 cm)

A horizon (absent in many pedons):
Color—value moist of 2 or 3; chroma moist of 1 to 3
Texture—silt loam, loam, or fine sandy loam
Reaction—strongly acid or moderately acid

Bw horizon:
Color—hue of 10YR or 7.5YR; value moist of 3 or 4; chroma moist of 3 or 4
Texture—stratified coarse sand, fine sand, sandy loam, and silt loam
Reaction—strongly acid or moderately acid

C horizon:
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 2 or 3
Texture—stratified sand through silt with composite texture of loam, fine sandy loam, or sandy loam
Reaction—slightly acid or neutral

2C horizon:
Color—variegated
Texture—sand or coarse sand
Rock fragments—40 to 75 percent (20 to 60 percent gravel, 0 to 25 percent cobbles)
Reaction—slightly acid to slightly alkaline

Mankomen Series

Taxonomic class: sandy, mixed, nonacid Histic Pergelic Cryaquepts
Depth class: very shallow to moderately deep—4 to 32 inches (10 to 81 cm) over permafrost
Drainage class: very poorly or poorly drained
Permeability: in the organic mat and mineral soil—moderately rapid; in the permafrost—impermeable
Position on landscape: lacustrine terraces
Parent material: sandy strandline deposits
Slope range: 0 to 10 percent
Elevation: 1,900 to 2,000 feet (579 to 610 m)
Climatic data (average annual):
precipitation—15 to 19 inches (38 to 48 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Mankomen peat—on a 5 percent slope under dwarf black spruce forest at 1,900 feet (579 m) elevation (all colors for moist soil)

Oi—15 to 8 inches (38 to 20 cm); dark reddish brown (5YR 3/3) peat; raw fibrous moss, twigs, and root fibers; gradual smooth boundary
Oe—8 inches to 0 (20 cm to 0); black (10YR 2/1) mucky peat; partially decomposed moss, twigs, and root fibers; diffuse irregular boundary
Cg/Oa—0 to 5 inches (0 to 13 cm); very dark gray (5Y 3/1) loamy sand and black (10YR 2/1) muck; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine and fine roots; moderately acid (pH 6.0); diffuse wavy boundary
Cg—5 to 24 inches (13 to 61 cm); dark olive gray (5Y 3/2) and olive (5Y 4/4) sand; single grain; loose, nonsticky and nonplastic; common medium faint dark gray (5Y 4/1) mottles; slightly acid (pH 6.4); gradual wavy boundary
C—24 to 27 inches (61 to 69 cm); dark grayish brown (2.5Y 4/2) loamy sand; single grain; loose, nonsticky and nonplastic; slightly acid (pH 6.4); gradual wavy boundary
Cf—27 to 37 inches (69 to 94 cm); dark grayish brown (2.5Y 4/2) loamy sand; slightly acid (pH 6.4)—frozen on August 29, 1992

Typical Pedon Location

Map unit in which located: TS3—Mankomen peat, 0 to 15 percent slopes
Location in survey area: about 3 miles (5 km) northwest of Sourdough in the NE1/4 of the NE1/4 of sec. 11, T.9N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 8 to 16 inches (20 to 40 cm)
Depth to permafrost: 3 to 35 inches (8 to 89 cm) below the mineral surface

O horizon:
Reaction—moderately acid to slightly acid

Cg and Cg/O horizons:
Cg part—Color—hue of 10YR, 2.5Y, 5Y, or 5GY; value moist of 2 to 4; chroma moist of 1 or 2
Texture—fine sandy loam, loamy sand, or sand
O part—Color—value moist of 2 or 3; chroma moist of 1 or 2
Texture—muck or mucky peat
Redox depletions (when present)— hue of 5Y or 5GY; value moist of 3 or 4; chroma moist of 1 or 2
Rock fragments—0 to 20 percent gravel
Reaction—moderately acid to neutral

C horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value moist of 2 to 4; chroma moist of 1 or 2
Texture—fine sand, loamy fine sandy, loamy sand, and sand
Rock fragments—0 to 5 percent gravel
Reaction—slightly acid to mildly alkaline

Mendna Series

(Figures 10 and 15)

Taxonomic class: loamy, mixed, nonacid Histic Pergelic Cryaquepts
Depth class: shallow to moderately deep—2 to 39 inches (5 to 99 cm) over permafrost
Drainage class: very poorly or poorly drained
Permeability: in the organic mat—moderately rapid; in the mineral soil—moderate; in the permafrost—impermeable
Position on landscape: broad lacustrine terraces and hills
Parent material: loamy lacustrine deposits
Slope range: 0 to 20 percent
Elevation: 1,900 to 2,950 feet (579 to 899 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Mendna peat—on a 4 percent slope under black spruce forest at 2,400 feet (732 m) elevation (all colors for moist soil)

Oi—9 to 5 inches (23 to 13 cm); very dusky red (2.5YR 2.5/2) peat; raw fibrous moss and root fibers; gradual smooth boundary
Oe—5 inches to 0 (13 cm to 0); black (10YR 2/1) mucky peat; partially decomposed moss and root fibers; diffuse irregular boundary
Cg1—0 to 11 inches (0 to 28 cm); dark greenish gray (5GY 4/1) loam; weak medium subangular blocky structure; friable, sticky and plastic; many large prominent dark brown (7.5YR 4/4) redox concentrations; 10 percent gravel; common very fine and fine roots; neutral (pH 6.6); gradual wavy boundary
Cg2—11 to 21 inches (28 to 53 cm); dark greenish gray (5GY 4/1) loam; weak medium subangular blocky structure; friable, sticky and plastic; many large prominent strong brown (7.5YR 4/6) redox concentrations; 10 percent gravel; few very fine and fine roots; neutral (pH 6.8); gradual wavy boundary
C—21 to 39 inches (53 to 99 cm); dark grayish brown (2.5Y 4/2) gravelly clay loam; 15 percent gravel and 5 percent cobbles; mildly alkaline (pH 7.4); abrupt smooth boundary

Cf—39 to 49 inches (99 to 125 cm); dark grayish brown (2.5Y 4/2) gravelly clay loam; 15 percent gravel and 5 percent cobbles; mildly alkaline (pH 7.4); abrupt smooth boundary—frozen on August 13, 1992

Typical Pedon Location

Map unit in which located: LL2—Mendna-Ewan complex, 0 to 6 percent slopes
Location in survey area: about 14 miles (8 km) north of Sourdough in the NE1/4 of the SE1/4 of sec. 10, T11N., R2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 8 to 15 inches (20 to 38 cm)
Depth to permafrost: 2 to 39 inches (5 to 99 cm) below the mineral surface

O horizon:
Reaction—strongly acid or moderately acid

Cg horizon:
Color—hue of 10YR, 2.5Y, 5Y, or 5GY; value moist of 3 to 5; chroma moist of 1 or 2
Redox concentrations—hue of 7.5YR or 10YR; value moist of 4 or 5; chroma moist of 1 or 2
Texture—loam, clay loam, silt loam, or silty clay loam
Rock fragments—0 to 30 percent (0 to 30 percent gravel, 0 to 10 percent cobbles)
Reaction—moderately acid to slightly alkaline

C horizon (when present):
Color—hue of 10YR, 2.5Y, or 5Y; value moist of 4 or 5; chroma moist of 1 or 2
Texture—loam, clay loam, silt loam, or silty clay loam
Rock fragments—0 to 30 percent (0 to 30 percent gravel, 0 to 10 percent cobbles)
Reaction—slightly acid to slightly alkaline
Effervescence—none or slight

Nickolna Series

(Figure 15)

Taxonomic class: fine-loamy, mixed Typic Cryumbrepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: moderate
Position on landscape: mountains, hills, and lacustrine terraces
Parent material: thin silty loess mantle over loamy lacustrine deposits
Slope range: 4 to 16 percent
Elevation: 2,600 to 2,900 feet (792 to 884 m)
Climatic data (average annual):
precipitation—18 to 21 inches (46 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Nickolna silt loam—on a 14 percent slope under open white spruce forest and glandular birch scrub at 2,650 feet (808 m) elevation (all colors for moist soil)

Oi—2 inches to 0 (5 cm to 0); peat; fibrous moss and forest litter; clear wavy boundary
A—0 to 8 inches (0 to 20 cm); very dark brown (10YR 2/2) silt loam; moderate coarse

granular structure; friable, slightly sticky and slightly plastic; many roots of all sizes; moderately acid (pH 5.6); gradual wavy boundary

2C1—8 to 11 inches (20 to 28 cm); dark grayish brown (2.5Y 4/2) loam; moderate coarse granular structure; friable, sticky and plastic; 5 percent subangular and subrounded gravel; common very fine and fine roots: moderately acid (pH 5.8); diffuse irregular boundary

2C2—11 to 44 inches (28 to 112 cm); dark grayish brown (2.5Y 4/2) clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; 5 percent gravel and 5 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary

2C3—44 to 60 inches (112 to 152 cm); dark grayish brown (2.5Y 4/2) cobbly clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; 10 percent subrounded and subangular gravel and 10 percent subangular and subrounded cobbles; neutral (pH 6.6)

Typical Pedon Location

Map unit in which located: SA1—Nickolna silt loam, 4 to 16 percent slopes
Location in survey area: about 19 miles (30 km) north of Sourdough in the NE1/4 of the NW1/4 of sec. 20, T.11N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)
Thickness of the loess mantle: 1 to 8 inches (3 to 13 cm)
Reaction: strongly acid to neutral

A and 2A horizons:
Color— value moist of 2 or 3; chroma moist of 1 to 3
Texture—silt loam, loam, or clay loam
Rock fragments—0 to 5 percent gravel and cobbles
Reaction—strongly acid or moderately acid

2C horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value moist of 3 or 4; chroma moist of 1 or 2
Texture—loam, clay loam, or silty clay loam
Rock fragments—0 to 25 percent (0 to 25 percent gravel, 0 to 15 percent cobbles)
Reaction—moderately acid to neutral

Ogtna Series

Taxonomic class: coarse-loamy over sandy or sandy-skeletal, mixed Entic Cryumbrepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the stratified sand and silt—moderate; in the sand and gravel—rapid
Position on landscape: stream terraces
Parent material: stratified sandy and silty alluvium over gravelly alluvium
Slope range: 0 to 9 percent
Elevation: 2,800 to 2,950 feet (853 to 899 m)
Climatic data (average annual):
precipitation—18 to 21 inches (46 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Ogtna mucky fine sandy loam—on a level slope under white spruce forest at 2,850 feet (869 m) elevation (all colors for moist soil)

Oi—6 to 2 inches (15 to 5 cm); dark reddish brown (2.5YR 3/1) peat consisting of fibrous moss, roots, and twigs; many very fine roots; clear smooth boundary
Oa—2 inches to 0 (5 cm to 0); black (10YR 2/1) muck consisting of decomposed moss, roots, and twigs; many very fine roots; clear smooth boundary
A/Oa1—0 to 4 inches (0 to 10 cm); dark brown (10YR 3/3) and 40 percent black (10YR 2/1) occurring in a stratified pattern; stratified sand, fine sand, very fine sand, silt, and muck with a composite texture of mucky fine sandy loam; moderate medium subangular blocky structure; very friable, nonsticky and nonplastic; many very fine roots; strongly acid (pH 5.4); clear smooth boundary
A/Oa2—4 to 13 inches (10 to 33 cm); dark brown (10YR 3/3) and 25 percent black (10YR 2/1) occurring in a stratified pattern; stratified sand, fine sand, very fine sand, silt, and muck with a composite texture of sandy loam; moderate medium subangular blocky structure; very friable, nonsticky and nonplastic; many very fine roots; moderately acid (pH 6.0); abrupt smooth boundary
2C—13 to 60 inches (33 to 152 cm); variegated extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 65 percent gravel; moderately acid (pH 6.0)

Typical Pedon Location

Map unit in which located: ST12—Ogtna mucky fine sandy loam
Location in survey area: about 25 miles (40 km) southwest of Paxson in the SE1/4 of the NE1/4 of sec. 1, T.13N., R.5W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 1 to 6 inches (3 to 15 cm)
Depth to sand and gravel: 13 to 27 inches (33 to 69 cm)

A/Oa or A/Oe horizon :
Color—value moist of 2 or 3; chroma moist of 1 to 3
Texture—stratified very fine sandy loam, fine sandy loam, silt loam, muck, and mucky peat, with a composite texture of loam, fine sandy loam, or sandy loam
Reaction—strongly acid or moderately acid

2C horizon:
Color—variegated
Texture—coarse sand or sand
Reaction—neutral
Rock fragments—40 to 75 percent (35 to 65 percent rounded gravel, 0 to 20 percent rounded cobbles)

Pergelic Cryohemists

(Figures 10, 11, and 13; Plate 9—upper photo)

Taxonomic class: Pergelic Cryohemists
Depth class: shallow to moderately deep—19 to over 40 inches (48 to over 102 cm) over permafrost
Drainage class: well drained or very poorly drained
Permeability: on the organic mat—moderately rapid; in the mineral soil (when present)—variable; in the permafrost—impermeable

Position on landscape: broad lacustrine terraces and stream terraces
Microtopography: palsen and peat mounds
Parent material: organic materials of varying thickness over loamy and clayey lacustrine deposits and stratified sandy and silty alluvium
Slope range: 0 to 14 percent
Elevation: 1,850 to 2,850 feet (564 to 869 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Sample Pedon

Pergelic Cryohemists—on a 2 percent slope under ericaceous shrubs and sedges at 2,050 feet (625 m) elevation (all colors for moist soil)

Oi—0 to 9 inches (0 to 23 cm); black (10YR 2/1) squeezed peat consisting of undecomposed sedges, roots, and ericaceous shrub fibers; 90 percent fibers unrubbed, 80 percent fibers rubbed; many very fine, fine, and medium roots; neutral (pH 6.8); gradual wavy boundary

Oe1—9 to 20 inches (23 to 51 cm); dark reddish brown (5YR 2.5/2) squeezed mucky peat consisting of undecomposed sedges, roots, and ericaceous shrub fibers; 80 percent fibers unrubbed, 50 percent fibers rubbed; many very fine, fine, and medium roots; slightly acid (pH 6.4); gradual smooth boundary

Oe2—20 to 29 inches (51 to 74 cm); dark reddish brown (5YR 3/3) squeezed mucky peat consisting of partially decomposed sedges, roots, and ericaceous shrub fibers; 60 percent fibers unrubbed, 35 percent fibers rubbed; common very fine and fine roots; slightly acid (pH 6.2); abrupt wavy boundary

Oef—29 to 39 inches (74 to 99 cm); dark reddish brown (5YR 3/3) squeezed frozen mucky peat consisting of partially decomposed sedges, roots, and ericaceous shrub fibers; 60 percent fibers unrubbed, 35 percent fibers rubbed; slightly acid (pH 6.2)—frozen August 1, 1992

Typical Pedon Location

Map unit in which located: MK2—Pergelic Cryohemists and Cryofibrists soils
Location in survey area: about 7 miles (11 km) northwest of Sourdough in the NE1/4 of the SE1/4 of sec. 29, T.10N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 16 to over 60 inches (41 to over 152 cm)
Depth to permafrost: 19 to over 60 inches (48 to over 152 cm) below the organic surface

O horizon:
Color—hue of 5YR, 7.5YR, or 10YR; value moist of 2 to 4; chroma moist of 1 to 6
Reaction—very strongly acid to neutral

C or Cg horizon (when present):
Color—hue of 2.5Y, 5Y, 5GY, or 5G; value moist of 3 to 5; chroma moist of 1 or 2
Texture—fine sandy loam, loam, clay, silty clay, silty clay loam, or clay loam
Rock fragments—0 to 20 percent cobbles and gravel
Reaction—neutral or mildly alkaline

Pippod Series

(Figures 8 and 14)

Taxonomic class: sandy-skeletal, mixed Typic Haplocryods
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: somewhat excessively drained
Permeability: in the silty loess mantle—moderate; below this—rapid
Position on landscape: broad lacustrine terraces and glacial outwash plains
Parent material: thin silty loess mantle over gravelly and cobbly glacial outwash deposits
Slope range: 0 to 30 percent
Elevation: 1,900 to 3,000 feet (579 to 914 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Pippod silt loam—on a 2 percent slope under white spruce forest at 2,500 feet (762 m) elevation (all colors for moist soil)

Oi—2 inches to 0 (5 cm to 0); dark brown (7.5YR 3/2) peat; fibrous roots, twigs, and leaf litter; clear smooth boundary

E/A—0 to 1 inch (0 to 3 cm); dark grayish brown (10YR 4/2) and very dark brown (10YR 2/2) silt loam; weak coarse granular structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; strongly acid (pH 5.2); abrupt wavy boundary

Bs—1 to 5 inches (3 to 13 cm); dark reddish brown (5YR 3/4 and 7.5YR 4/4) fine sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; strongly acid (pH 5.4); clear wavy boundary

BC—5 to 8 inches (13 to 20 cm); dark yellowish brown (10YR 4/4) fine sandy loam; very friable; loose, nonsticky and nonplastic; common very fine, fine, and medium roots; moderately acid (pH 5.8); clear wavy boundary

2BC—8 to 14 inches (20 to 36 cm); dark yellowish brown (10YR 4/4) very gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 40 percent rounded pebbles and 15 percent rounded cobbles; slightly acid (pH 6.4); gradual irregular boundary

2C—14 to 60 inches (36 to 152 cm); dark brown (10YR 3/3) extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 45 percent rounded pebbles and 20 percent rounded cobbles; slightly acid (pH 6.4)

Typical Pedon Location

Map unit in which located: AT1—Chistna and Pippod soils, 0 to 14 percent slopes
Location in survey area: about 13 miles (21 km) north of Sourdough in the NE1/4 of the NE1/4 of sec. 22, T.11N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 1 to 2 inches (3 to 5 cm)
Depth to sand and gravel: 1 to 8 inches (3 to 20 cm)
Thickness of solum: 3 to 9 inches (8 to 23 cm)

A/E or E horizon:
Color—hue of 7.5YR or 10YR; value moist of 2 to 4; chroma moist of 1 to 3
Texture—silt loam or fine sandy loam
Reaction—very strongly or strongly acid

Bs horizon:
Color—hue of 5YR, 7.5YR, or 10YR; value moist of 3 or 4; chroma moist of 3 to 6
Texture—silt loam or fine sandy loam
Rock fragments—0 to 25 percent gravel and cobbles
Reaction—strongly to moderately acid

BC and 2BC horizons:
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 4 to 6
Texture—coarse sand, loamy coarse sand, sand, loamy sand, or fine sandy loam
Rock fragments—0 to 70 percent (30 to 70 percent gravel, 0 to 25 percent cobbles)
Reaction—strongly or moderately acid

2C horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value moist of 3 or 4; chroma moist of 1 or 2
Texture—coarse sand, loamy coarse sand, sand, or loamy sand
Rock fragments—35 to 70 percent (30 to 70 percent gravel, 0 to 25 percent cobbles)
Reaction—moderately or slightly acid

Sankluna Series

(Figure 7)

Taxonomic class: sandy, mixed, nonacid Typic Cryofluvents
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: moderately rapid
Position on landscape: flood plains
Parent material: stratified sandy alluvium
Slope range: 0 to 15 percent
Elevation: 2,400 to 2,600 feet (732 to 792 m)
Climatic data (average annual):
precipitation—18 to 21 inches (46 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Sankluna fine sandy loam—on a level slope under bluejoint grass and willow shrub at 2,450 feet (747 m) elevation (all colors for moist soil)

AC—0 to 11 inches (0 to 28 cm); dark brown (10YR 3/3) fine sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; many very fine and fine roots; slightly acid (pH 6.5); gradual smooth boundary
C1—11 to 17 inches (28 to 43 cm); dark grayish brown (2.5Y 4/2) stratified fine sand and sand; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; many very fine and fine roots; slightly acid (pH 6.4); gradual smooth boundary
C2—17 to 43 inches (43 to 109 cm); dark grayish brown (2.5Y 4/2) stratified fine sand and sand; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; few very fine roots; slightly acid (pH 6.4); clear smooth boundary
C3—43 to 60 inches (109 to 152 cm); very dark grayish brown (2.5Y 4/2) stratified sand, fine sandy loam, and silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; slightly acid (pH 6.4)

Typical Pedon Location

Map unit in which located: FP23—Hogan, cool-Sankluna complex, 0 to 15 percent slopes

Location in survey area: about 12 miles (19 km) north of Sourdough in the SE1/4 of the SW1/4 of sec. 20, T.13N., R.3W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 0 to 1 inch (0 to 3 cm)

AC horizon:
Color—hue of 10YR or 2.5Y; value moist of 2 or 3; chroma moist of 1 to 3
Texture—fine sandy loam, loamy fine sand, and fine sand
Reaction—slightly acid or neutral

C horizon:
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 2 or 3;
occasional pockets and strata of organic materials— hue of 7.5YR or 10YR; chroma moist of 1 or 2
Texture—stratified sand, fine sandy loam, and silt loam;
occasional pockets and strata of organic materials—texture of muck or mucky peat;
composite texture—loamy sand, loamy fine sand, fine sand, or sand
Reaction—slightly acid to slightly alkaline

Sinona Series

(Figure 5)

Taxonomic class: sandy-skeletal, mixed Typic Cryochrepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: somewhat excessively drained
Permeability: above the sand and gravel—moderate; below this—rapid
Position on landscape: stream terraces
Parent material: stratified sandy and silty alluvium over sandy and gravelly alluvium
Slope range: 0 to 20 percent
Elevation: 1,950 to 2,250 feet (594 to 686 m)
Climatic data (average annual):
precipitation—15 to 19 inches (38 to 48 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Sinona silt loam—on a 0 percent slope under white spruce forest at 2,250 feet (686 m) elevation (all colors for moist soil)

Oi—2 inches to 0 (5 cm to 0); dark reddish brown (5YR 3/3) peat; fibrous moss, roots, and twigs; many roots of all sizes; abrupt smooth boundary
Bw—0 to 3 inches (0 to 8 cm); strong brown (7.5YR 4/6) loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; moderately acid (pH 5.6); clear wavy boundary
BC—3 to 9 inches (8 to 23 cm); olive brown (2.5Y 4/4) stratified sand, fine sandy loam, and silt loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; few very fine roots; moderately acid (pH 5.8); abrupt irregular boundary
2C—9 to 60 inches (23 to 152 cm); very dark grayish brown (10YR 3/3) very cobbly coarse sand; single grain; loose, nonsticky and nonplastic; 35 percent rounded gravel and 20 percent rounded cobbles; slightly acid (pH 6.2)

Typical Pedon Location

Map unit in which located: ST41—Maclaren-Sinona complex, 0 to 15 percent slopes
Location in survey area: about 12 miles (19 km) northwest of Sourdough in the NW1/4 of the NE1/4 of sec. 32, T.11N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)
Depth to sand and gravel: 2 to 10 inches (5 to 25 cm)

A horizon (absent in many pedons):
Color—value moist of 2 or 3; chroma moist of 1 to 3
Texture—silt loam, loam, or fine sandy loam
Reaction—strongly acid or moderately acid

Bw horizon:
Color—hue of 10YR, 7.5YR, or 5YR; value moist of 3 or 4; chroma moist of 3 to 6
Texture—loam, sandy loam, or fine sandy loam
Rock fragments—0 to 20 percent gravel and cobbles
Reaction—strongly acid or moderately acid

2C horizon:
Color—variegated
Texture—sand or coarse sand
Rock fragments—40 to 75 percent (20 to 60 percent gravel, 0 to 25 percent cobbles)
Reaction—slightly acid or neutral

Swedna Series

(Figures 2 and 4; Plate 6—upper photo)

Taxonomic class: coarse-loamy over sandy or sandy-skeletal, mixed, nonacid Typic Cryaquents
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly or poorly drained
Permeability: in the stratified sandy and silty material—moderate; in the sand and gravel—rapid
Position on landscape: flood plains
Parent material: stratified sandy and silty alluvium over gravelly alluvium
Slope range: 0 to 8 percent
Elevation: 1,850 to 2,900 feet (564 to 884 m)
Climatic data (average annual):
precipitation—15 to 21 inches (38 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Swedna fine sandy loam—on a 2 percent slope under low willow shrub vegetation at 2,475 feet (754 m) elevation (all colors for moist soil)

Oi/C—1 inch to 0 (3 cm to 0); dark reddish brown (5YR 3/3) peat with lenses of very dark grayish brown (10YR 3/2) fine sandy loam; many very fine, fine, and medium roots; neutral (pH 6.6); abrupt smooth boundary
AC—0 to 1 inch (0 to 3 cm); very dark grayish brown (10YR 3/2) fine sandy loam; weak thick platy structure; very friable, nonsticky and nonplastic; many very fine, fine, and

medium roots; neutral (pH 6.6); clear smooth boundary

C—1 to 8 inches (3 to 20 cm); dark grayish brown (10YR 4/2) stratified fine sand through silt with composite texture of fine sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine and fine roots; neutral (pH 6.6); clear smooth boundary

Cg1—8 to 27 inches (20 to 69 cm); very dark grayish brown (10YR 3/2) stratified fine sand through silt with composite texture of fine sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; many medium prominent yellowish red (5YR 4/6) redox concentrations and dark greenish gray (5GY 4/1) redox depletions; common very fine and fine roots; neutral (pH 6.8); gradual wavy boundary

Cg2—27 to 31 inches (69 to 79 cm); dark greenish gray (5GY 4/1) stratified sand through silt with composite texture of sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; many medium prominent dark reddish brown (2.5YR 3/4) redox concentrations; common very fine and fine roots; neutral (pH 6.8); clear smooth boundary

2C—31 to 60 inches (79 to 152 cm); dark brown (10YR 3/3) very gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 40 percent rounded gravel, 10 percent rounded cobbles; neutral (pH 7.0)

Typical Pedon Location

Map unit in which located: FP2—Dackey, cool-Swedna-Swedna, very poorly drained, complex, 0 to 8 percent slopes

Location in survey area: about 19 miles (30 km) north of Sourdough in the NW1/4 of the NW1/4 of sec. 29, T.12N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 0 to 2 inches (0 to 5 cm)
Depth to sand and gravel: 10 to 37 inches (25 to 94 cm)
Depth to redoximorphic features: 0 to 10 inches (0 to 25 cm)

AC or ACg horizon:
Color—hue of 10YR or 5Y; value moist of 2 to 4; chroma moist of 1 to 3
Texture—fine sandy loam, sandy loam, or fine sand
Reaction—slightly acid to slightly alkaline
Effervescence—none or slight

C horizon:
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 1 to 3
Texture—stratified sand through silt, with composite texture of fine sandy loam or sandy loam;
occasional pockets and strata of organic materials—texture of muck or mucky peat
Reaction—slightly acid to slightly alkaline
Effervescence—none or slight
Other—common pockets and strata of organic materials

Cg horizon:
Color—hue of 10YR to 5BG; value moist of 2.5 to 4; chroma moist of 1 or 2
Texture—stratified sand through silt with composite texture of fine sandy loam or sandy loam
Reaction—slightly acid to slightly alkaline
Effervescence—none or slight
Other—when present, redox concentrations—hue of 5YR to 10YR and chroma moist of 4 to 6; redox depletions—hue of 2.5Y to 5GY and chroma moist of 1 or 2

2C horizon:
Color—variegated
Texture—sand or coarse sand
Rock fragments—35 to 70 percent (25 to 60 percent gravel, 0 to 30 percent cobbles)
Reaction—slightly acid or neutral
Effervescence—none or slight
Other—common pockets and strata of sand and silt

Swillna Series

(Figure 12)

Taxonomic class: clayey, mixed, nonacid Pergelic Ruptic-Histic Cryaquepts
Depth class: shallow to deep—8 to 60 inches (20 to 152 cm) over permafrost
Drainage class: very poorly or poorly drained
Permeability: in the organic mat—moderately rapid; in the mineral soil—moderate; in the permafrost—impermeable
Position on landscape: broad lacustrine terraces
Parent material: clayey lacustrine deposits
Slope range: 0 to 15 percent
Elevation: 2,300 to 2,500 feet (701 to 762 m)
Climatic data (average annual):
precipitation—15 to 19 inches (38 to 48 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Swillna peat—on a 1 percent slope under black and white spruce forest with an understory of cottongrass tussocks at 2,400 feet (732 m) elevation

Note—This profile is separated into two parts: the first part is in an inter-mound area between frost boils; the second part is from within the mound or boil. Mound-inter-mound topography consists of about 60 percent inter-mounds and 40 percent mounds. One complete cycle of mound-inter-mound occurs about every 12 feet (3.7 m).

Part I—Inter-mounds

Oi1—9 to 3 inches (23 to 9 cm); dark yellowish brown (10YR 3/6) peat; slightly decomposed eriophorum stems and root fibers; abrupt irregular boundary

Oi2—3 inches to 0 (9 cm to 0); dark yellowish brown (10YR 3/4) peat; slightly decomposed eriophorum stems and root fibers; abrupt wavy boundary

Bg—0 to 9 inches (0 to 23 cm); dark gray (5Y 4/1) and 40 percent olive brown (2.5Y 4/4) silty clay loam; moderate medium subangular blocky structure; friable, very sticky and very plastic; few very fine and fine roots; slightly acid (pH 6.1); abrupt wavy boundary

Oib—9 to 12 inches (23 to 30 cm); very dark brown (10YR 2/2) and 20 percent dark yellowish brown (10YR 3/6) slightly decomposed fibrous eriophorum stems and roots; slightly acid (pH 6.1); abrupt wavy boundary

Cf—12 to 22 inches (30 to 56 cm); dark grayish brown (2.5Y 4/2) silty clay loam; slightly acid (pH 6.2)—frozen on August 12, 1994

Part II—Mounds

Oi—1 inch to 0 (3 cm to 0); dark yellowish brown (10YR 3/4) peat; slightly decomposed eriophorum stems and root fibers; abrupt wavy boundary

Bw1—0 to 6 inches (0 to 15 cm); dark grayish brown (2.5Y 4/2) silty clay loam; strong coarse granular structure; friable, very sticky and very plastic; many very fine and fine roots; slightly acid (pH 6.4); abrupt wavy boundary

Bw2—6 to 16 inches (15 to 41 cm); dark grayish brown (2.5Y 4/2) silty clay loam; strong fine subangular blocky structure; friable, very sticky and very plastic; common very fine

and fine roots; slightly acid (pH 6.4); abrupt irregular boundary

C—16 to 39 inches (41 to 99 cm); dark grayish brown (2.5Y 4/2) silty clay loam; massive; friable, very sticky and very plastic; slightly acid (pH 6.4) abrupt irregular boundary

Oab—39 to 40 inches (99 to 102 cm); dark grayish brown (2.5Y 4/2) muck; slightly acid (pH 6.2); abrupt irregular boundary

Cf—40 to 50 inches (102 to 127 cm); dark grayish brown (2.5Y 4/2) silty clay loam; slightly acid (pH 6.2)—frozen on August 12, 1994

Typical Pedon Location

Map unit in which located: LC6—Swillna, thin surface-Swillna complex, 0 to 15 percent slopes

Location in survey area: about 32 miles (51 km) west of Sourdough in the NW1/4 of the SE1/4 of sec. 8, T.10N., R.6W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: in mounds—0 to 4 inches (0 to 10 cm); in inter-mounds—8 to 14 inches (20 to 36 cm)

Depth to permafrost: in mounds—23 to 60 inches (58 to 152 cm) below the mineral surface; in inter-mounds—18 to 33 inches (46 to 84 cm) below the mineral surface

O horizon:
Reaction—moderately acid or slightly acid

AC horizon (when present):
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 1 to 3
Reaction—slightly acid to slightly alkaline

Bg horizon (when present):
Color—hue of 2.5Y, 5Y, 5G, or 5GY; value moist of 4 or 5; chroma moist of 0 to 2
Texture—clay, silty clay, or silty clay loam
Rock fragments—0 to 20 percent (0 to 10 percent cobbles, 0 to 15 percent gravel)
Reaction—slightly acid to mildly alkaline
Other—common pockets and lenses of organic material

Bw horizon (when present):
Color—hue of 10YR, 2.5Y, or 5Y; value moist of 4 or 5; chroma moist of 1 to 3
Texture—clay, silty clay, or silty clay loam
Rock fragments—0 to 5 percent cobbles and gravel
Reaction—slightly acid to mildly alkaline
Other—common pockets and lenses of organic material

C horizon:
Color—hue of 2.5Y or 5Y; value moist of 4 or 5; chroma moist of 1 or 2
Texture—clay, silty clay, or silty clay loam
Rock fragments—0 to 5 percent cobbles and gravel
Reaction—slightly acid to mildly alkaline
Effervescence—none to strong; disseminated lime more prevalent with depth

Tangoe Series

(Figures 3 and 8; Plate 3—lower photo)

Taxonomic class: sandy-skeletal, mixed, nonacid Oxyaquic Cryorthents
Depth class: very deep—more than 60 inches (more than 152 cm)

Drainage class: very poorly, poorly, or somewhat poorly drained; saturated conditions (oxyaquic) at 2 to 40 inches (5 to 102 cm)
Permeability: in the stratified sandy and silty material—moderate; in the sand and gravel—rapid
Position on landscape: flood plains
Parent material: stratified sandy and silty alluvium over gravelly alluvium
Slope range: 0 to 8 percent
Elevation: 2,400 to 2,900 feet (732 to 884 m)
Climatic data (average annual):
precipitation—18 to 21 inches (46 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Tangoe sandy loam—on a level slope under willow shrub vegetation at 2,500 feet (762 m) elevation (all colors for moist soil)

Oe—1 inch to 0 (3 cm to 0); black (10YR 2/1) peat; many very fine, fine, and medium roots; moderately acid (pH 5.6); abrupt smooth boundary
AC1—0 to 1 inch (0 to 3 cm); very dark grayish brown (10YR 3/2) sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; mottles; common very fine, fine, and medium roots; slightly acid (pH 6.2); clear smooth boundary
AC2—1 to 8 inches (3 to 20 cm); very dark grayish brown (10YR 3/2) stratified sand through silt with a composite texture of sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; few fine distinct olive gray (5Y 4/2) redox depletions and dark yellowish brown (10YR 4/4) redox concentrations; common very fine and fine roots; slightly acid (pH 6.2); clear wavy boundary
2C1—8 to 16 inches (20 to 41 cm); dark brown (10YR 3/3) extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; common very fine and fine roots; 45 percent rounded gravel and 15 percent rounded cobbles; slightly acid (pH 6.2); gradual wavy boundary
2C2—16 to 60 inches (41 to 152 cm); dark brown (10YR 3/3) extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; common very fine and fine roots; 45 percent rounded gravel and 15 percent rounded cobbles; neutral (pH 6.6)

Typical Pedon Location

Map unit in which located: FP1—Tangoe sandy loam, frequently flooded
Location in survey area: about 22 miles (35 km) north of Sourdough in the SE1/4 of the NE1/4 of sec. 6, T.12N., R.2E., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 0 to 2 inches (0 to 5 cm)
Depth to sand and gravel: 1 to 10 inches (3 to 25 cm)

A or AC horizon:
Color—hue of 10YR or 2.5Y; value moist of 2 to 4; chroma moist of 1 to 3
Texture—stratified sand through silt with composite texture of sandy loam or fine sandy loam
Reaction—slightly acid to slightly alkaline
Other—few redox concentrations and depletions in some pedons

2C horizon:
Color—variegated
Texture—sand or coarse sand

Rock fragments—35 to 70 percent (30 to 50 percent gravel, 5 to 20 percent cobbles)
Reaction—slightly acid to moderately alkaline
Effervescence—none to slight
Other—common pockets and strata of sand and silt

Telay Series

Taxonomic class: loamy-skeletal, mixed Typic Cryochrepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: moderate
Position on landscape: hills and mountains
Microtopography: backslopes and summits
Parent material: thin mantle of loess over gravelly glacial till
Slope range: 0 to 25 percent
Elevation: 2,300 to 3,000 feet (701 to 914 m)
Climatic data (average annual):
precipitation—18 to 21 inches (46 to 53 cm)
air temperature—24° to 26°F (-4° to -3°C)

Typical Pedon

Telay silt loam—on a 8 percent slope under glandular birch scrub at 2,900 feet (884 m) elevation (all colors for moist soil)

Oe—2 inches to 0 (5 cm to 0); dark yellowish brown (10YR 3/4) mucky peat; partially decomposed moss, twigs, and root fibers; abrupt smooth boundary
AE—0 to 2 inches (0 to 5 cm); dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; very strongly acid (pH 5.0); clear smooth boundary
2Bw—2 to 11 inches (5 to 28 cm); dark yellowish brown (10YR 4/4) gravelly loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; common roots of all sizes; strongly acid (pH 5.2); abrupt smooth boundary
2C1—11 to 26 inches (28 to 66 cm); dark grayish brown (2.5Y 4/2) very gravelly loam; weak coarse subangular blocky structure; friable, nonsticky and nonplastic; 30 percent subangular gravel and 5 percent subangular cobbles; moderately acid (pH 5.8); gradual irregular boundary
2C2—26 to 60 inches (66 to 152 cm); dark grayish brown (2.5Y 4/2) very gravelly loam; massive; firm, nonsticky and nonplastic; 35 percent subangular gravel and 5 percent subangular cobbles; moderately acid (pH 6.0)

Typical Pedon Location

Map unit in which located: AL2—Cobblank and Telay soils, 2 to 16 percent slopes
Location in survey area: about 13 miles (21 km) north of Sourdough in the NW1/4 of the NW1/4 of sec. 28, T.11N., R.2W., Copper River Meridian

Range in Characteristics

Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)
Thickness of the loess mantel: 1 to 3 inches (3 to 8 cm)
Thickness of solum: 3 to 11 inches (8 to 28 cm)

AE, E, or A horizon:
Color—value moist of 2 to 5; chroma moist of 1 to 3
Texture—silt loam, very fine sandy loam, or loam
Reaction—very strongly acid or strongly acid

2Bw horizon:
Color—hue of 7.5YR or 10YR; value moist of 3 or 4; chroma moist of 4 to 6
Texture—loam or sandy loam
Rock fragments—5 to 35 percent (5 to 35 percent gravel, 0 to 10 percent cobbles)
Reaction—strongly or moderately acid

2C horizon:
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 1 or 2
Texture—loam or sandy loam; occasional horizons of clay loam and silty clay loam in some pedons
Rock fragments—35 to 50 percent (30 to 50 percent gravel, 0 to 20 percent cobbles)
Reaction—moderately or slightly acid

APPENDIX E—VEGETATION COVER TYPES

A vegetation cover type is a basic unit of vegetation classification and represents a type of vegetation with relatively uniform structure and floristic composition. Each cover type is distinguished by the dominant and codominant plant species in the major strata (horizontal layers) in the existing vegetation. No particular ecological or seral status is intended or implied. Major categories of cover types in the Gulkana River area are:

Forest. Greater than about 25 percent canopy cover of trees. In mature stands, trees range in height from 15 to 50 feet (4.6 to 15.2 m) or more. Forest cover types are primarily on productive high flood plains but also occur on stream terraces, lacustrine terraces, and escarpments.

Woodland. Generally 10 to 25 percent canopy cover of trees but occasionally greater. In most stands, trees range in height from 12 to 35 feet (3.6 to 10.7 m). Woodland cover types occur primarily on less productive sites, often with shallow permafrost or restricted drainage, and on sites burned by wildfire.

Scrub. Generally less than 10 percent canopy cover of trees greater than 12 feet (greater than 3.6 m) tall, and greater than 25 percent canopy cover of shrubs and/or tree regeneration. Scrub cover types occur on a wide variety of soil and site conditions.

Meadow. Vegetation dominated by tall sedges and grasses, which usually form the tallest stratum. Combined canopy cover of trees and low, medium, and tall shrubs is less than 25 percent—typically less than 15 percent. Meadow cover types are restricted to poorly drained, wetland sites.

Cover type names are derived from the one or two most important species in the dominant or tallest stratum and, for most forest, woodland, and scrub types, the one or two most important species or a plant group in a defining lower stratum. Cover type names uniquely differentiate the type from all others and provide a link to the cover type descriptions. Names are not intended to completely characterize important strata and species in the cover type; not all important strata and species are included in the names.

Four miscellaneous cover types of restricted distribution and extent also are described. Three of these types represent early seral or pioneering plant communities. Vegetation cover is usually sparse and highly variable, and most stands have considerable bare soil. The fourth miscellaneous cover type encompasses the variety of emergent and submerged plant communities in shallow water in ponds and lakes.

Vegetation cover types in the Gulkana River area are listed in Table 19. In the following descriptions, the common name of the cover type is given on the first line and, if applicable, the scientific name and database code on the second and third lines.

Terminology in Cover Type Descriptions

Canopy Closure:

Closed: 75–100 percent canopy cover
Moderately closed: 60–75 percent canopy cover
Moderately open: 45–60 percent canopy cover
Open: 25–45 percent canopy cover

Woodland: 10–25 percent canopy cover; tree strata
Sparse: 10–25 percent canopy cover; shrub and herb strata

Species Summary Tables:

Scientific name. Scientific name of taxon or descriptive name of entry. Only taxa with greater than 10 to 15 percent constancy (see below), depending on the number of sample stands, are listed in the tables. Common names of plants are given in Table 20.

Stratum. Horizontal layer in which the taxon or entry occurs. Shrubs often cross strata boundaries. The stratum given in the summary tables is that which is most representative of the species in the cover type.

T1	Tall trees; mature trees generally greater than 35 feet (10.7 m) tall
T2	Medium trees; trees generally from 12 to 35 feet (3.6 to 10.7 m) tall
TX	Stunted, multi-strata trees; shorter stands of trees of mixed age classes and height growth with no discernible stratification; usually on less productive sites
T3	Tree regeneration; tree seedlings and small saplings usually less than 5 feet (1.2 m) tall
S2	Tall shrubs; shrubs that are 6 to 20 feet (1.8 to 6.1 m) tall or more with normal multiple stem growth form
SM	Medium shrubs; shrubs that are approximately 3 to 6 feet (0.9 to 1.8 m) tall
S3	Low shrubs; shrubs that are approximately 1 to 3 feet (30 to 91 cm) tall
S4	Dwarf shrubs; shrubs that are less than about 1 foot (30 cm) tall
F	Forbs; broad-leaved flowering plants, ferns, clubmoss, horsetails, and similar plants
G	Graminoids; grasses, sedges, and rushes
M	Mosses; total bryophytes
L	Lichens; total foliose and fruticose lichens
B	Barren; litter, bare soil and rock, and ponded water
T	Tree height; approximate height in feet of dominant tree layer
S	Shrub height; approximate height in feet of dominant or other indicated shrub layer
H	Herb height; approximate height in feet of herb layer

Con. Percent constancy; relative consistency of occurrence of a taxon. Calculated as:

$$\frac{\text{number of stands in which a taxon occurred}}{\text{total number of stands}} * 100$$

Avg. Average canopy cover in those stands in which a taxon occurred. Calculated as:

$$\frac{\text{sum of COVER across stands}}{\text{number of stands in which a taxon occurred}} * 100$$

Min. Minimum canopy cover; minimum COVER across stands.

Max. Maximum canopy cover; maximum COVER across stands.

Imp. Importance of taxon in cover type. Importance values are useful primarily for comparing taxa within a cover type. Calculated as:

$$\text{square root of (Con * Avg)}$$

Cover Type Descriptions

Aquatic herbaceous

Description

Aquatic herbaceous includes a number of aquatic plant communities growing in shallow water ponds and near-shore areas of larger lakes. The vegetation is characterized by aquatic plants growing entirely under the surface of the water or with leaves that float on the surface. The major community types include Pondlily, Burreed, and Fresh Pondweed (*Viereck et al. 1992*). Common species include *Nuphar polysepalum*, *Potamogeton* spp., *Sparganium* spp., *Equisetum fluviatile*, and *Hippuris vulgaris*. Aquatic buttercup communities (*Viereck et al. 1992*) are in backwater areas along the main river channel. Other fresh water Aquatic herbaceous types may also occur.

Setting

Distribution and extent: throughout the survey area; minor extent
Elevation: 1,850 to 3,200 feet (564 to 975 m)
Landforms: lakes and ponds in depressions on lacustrine terraces and till plains; oxbow lakes and other bodies of water on stream terraces and flood plains ponds

Successional Status

Communities within the Aquatic herbaceous type are generally considered to be early successional stages that will be replaced by marshes and wet meadows as the organic substrate builds up, the pond fills, and succession progresses (*Viereck et al. 1992*).

Riparian-Wetland Status

Classification: Palustrine rooted vascular aquatic bed, permanently flooded (*Cowardin et al. 1979*); riparian

Balsam poplar/thinleaf alder open forest
***Populus balsamifera / Alnus tenuifolia* open forest**
POBA2/ALTE2
(Figure 6; Plate 5—lower photo)

Description

Balsam poplar/thinleaf alder open forest consists of woodland to moderately open stands of *Populus balsamifera*. *Picea glauca* is common in the overstory in many stands and is often well-represented as a secondary tree layer. Tree canopy cover generally ranges from 15 to 60 percent. Balsam poplar/thinleaf alder open forest includes mature stands with trees 35 to 65 feet (10.7 to 19.8 m) in height and 7 to 11 inches (18 to 28 cm) in diameter at breast height. Larger diameter trees are in many stands. Younger stands of shorter, smaller trees and advanced regeneration also are included. Tree basal area in mature stands ranges from 160 to 275 feet^2/acre (36.7 to 63.1 m^2/ha). In all stands, regardless of age, *Populus balsamifera* trees tend to be poorly formed with broken, irregular, partially dead crowns. Most trees show evidence of heart rot and decay.

The forest understory is characterized by a sparse to closed layer of *Alnus tenuifolia* 6 to 20 feet (1.8 to 6.1 m) in height. Alder canopy cover ranges from 15 to 85 percent. In general, alder canopy cover decreases as the forest canopy cover increases. *Salix alaxensis*, a tall shrub remnant from earlier successional stages, is common in some stands. Most stands have a sparse to moderately open low shrub layer. Important low shrubs include *Rosa acicularis*, *Viburnum edule*, *Ribes* spp., and *Salix* spp.

The herb layer is highly variable in Balsam poplar/thinleaf alder open forest. Herb canopy cover ranges from sparse to closed and includes a wide variety of low to tall grasses and forbs. Important herbs include *Arctagrostis latifolia*, *Equisetum* spp. *Artemisia tilesii*, *Epilobium angustifolium*, *Aster sibiricus*, and *Hedysarum alpinum*. Leaf litter and mulch cover most of the soil surface in most stands. Woody litter from beaver felled *Populus balsamifera* and decadent willows is well-represented to abundant in many stands.

Setting

Distribution and extent: Main Stem from Canyon Rapids south, lower North and South Branches, and the West Fork; to Sourdough; moderate extent
Elevation: 1,900 to 2,400 feet (579 to 732 m)
Landforms: level to gently undulating flood plains; terrace height generally ranges from around 3 to 6 feet (0.9 to 1.8 m)
Principal soils: Dackey; Kluna, deep; and Klute, moderately wet
Depth to seasonally high water table: mostly 30 to 60 inches (76 to 152 cm) or more
Flooding frequency: occasional

Successional Status

Balsam poplar/thinleaf alder open forest is a mid seral stage of flood plain succession that develops from the thinleaf alder scrub types.

Riparian-Wetland Status

Classification: Riparian

Balsam poplar/thinleaf alder open forest
Populus balsamifera / Alnus tenuifolia open forest
POBA2/ALTE2

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T1	24	5	1	10	11
Populus balsamifera	T1	95	31	10	70	55
Picea glauca	T2	24	6	1	15	12
Picea glauca	T3	76	3	1	10	15
Populus balsamifera	T3	43	7	1	15	18
Alnus tenuifolia	S2	100	52	15	85	72
Potentilla fruticosa	S3	24	2	1	4	7
Ribes triste	S3	29	18	1	50	22
Rosa acicularis	S3	67	9	1	25	24
Salix alaxensis	S2	52	13	1	30	26
Salix arbusculoides	S2	24	6	1	10	12
Salix spp.	S3	38	11	1	45	20
Shepherdia canadensis	S3	29	2	1	6	8
Vaccinium vitis-idaea	S4	14	1	1	1	3
Viburnum edule	S3	29	20	2	35	24
Aconitum delphiniifolium	F	29	1	1	2	6
Anemone spp.	F	14	2	1	3	5
Artemisia tilesii	F	67	8	1	35	23
Aster sibiricus	F	76	5	1	25	19
Astragalus spp.	F	14	2	1	2	5
Epilobium angustifolium	F	67	6	1	25	20
Equisetum spp.	F	76	19	1	70	38
Galium boreale	F	14	2	1	3	6
Hedysarum alpinum	F	67	3	1	10	14
Linnaea borealis	F	24	4	1	10	10
Polemonium acutiflorum	F	19	3	1	5	7
Pyrola spp.	F	52	3	1	15	13
Rubus arcticus	F	19	1	1	1	4
Sanguisorba stipulata	F	14	2	1	2	5
Agropyron trachycaulum	G	19	1	1	3	5
Arctagrostis latifolia	G	62	16	1	85	31
Calamagrostis canadensis	G	24	2	1	5	7
Poa spp.	G	38	3	1	10	11
Moss layer	M	100	6	1	15	24
Lichen layer	L	76	1	1	5	10
Bare soil	B	62	2	1	10	11
Litter and mulch	B	100	65	1	95	80
Woody litter (>1" dia.)	B	81	10	4	30	29

Salix spp. includes: SABA3, SAMO2, SAPL2
Number of stands = 21.
ctsumtab

Balsam poplar-white spruce/thinleaf alder open forest

***Populus balsamifera-Picea glauca / Alnus tenuifolia* open forest**

POBA2-PIGL/ALTE2

(Figure 5)

Description

Balsam poplar-white spruce/thinleaf alder open forest consists of open to moderately open stands of mixed *Populus balsamifera* and *Picea glauca*. Tree canopy cover generally ranges from around 30 to 60 percent. Occasional woodland stands (10-25 percent forest canopy cover) also occur. Tree heights and diameters vary widely in Balsam poplar-white spruce/thinleaf alder forest. Included are stands dominated by tall, medium diameter *Populus balsamifera* in which *Picea glauca* form a somewhat lower, secondary layer. At the other extreme are stands dominated by *Picea glauca* 45 to 65 feet (13.7 to 19.8 m) in height and 8 to 14 inches (20 to 36 cm) in diameter at breast height, in which the shorter, subdominant *Populus balsamifera* are beginning to die off in the stand. In all stands, *Populus balsamifera* trees tend to be poorly formed with broken, irregular, partially dead crowns. Tree basal area in two sample stands was 210 and 275 feet^2/acre (48.2 and 63.1 m^2/ha).

The forest understory is characterized by a sparse to closed layer of *Alnus tenuifolia* 7 to 20 feet (2.1 to 6.1 m) in height. Alder canopy cover ranges from 15 to 85 percent. In general, alder canopy cover decreases as the forest canopy cover increases. *Salix alaxensis*, a tall shrub remnant from earlier successional stages, is common in some stands. Most stands have a sparse to moderately open low shrub layer. Important low shrubs include *Rosa acicularis*, *Viburnum edule*, *Ribes* spp., and *Salix* spp.

The herb layer is highly variable in Balsam poplar-white spruce/thinleaf alder open forest. Herb canopy cover ranges from sparse to closed and includes a wide variety of low to tall grasses and forbs. Important herbs include *Calamagrostis canadensis*, *Arctagrostis latifolia*, *Equisetum* spp. *Artemisia tilesii*, *Epilobium angustifolium*, *Aster sibiricus*, and *Hedysarum alpinum*. Leaf litter and mulch cover most of the soil surface in most stands. Woody litter from beaver felled *Populus balsamifera* and decadent willows are well-represented to abundant in many stands.

Setting

Distribution and extent: Main Stem from Canyon Rapids south, lower North and South Branches, and the West Fork; to Sourdough; moderate extent
Elevation: 1,900 to 2,400 feet (579 to 732 m)
Landforms: level to gently undulating flood plains; terrace height generally from around 3 to 6 feet (0.9 to 1.8 m)
Principal soils: Dackey; Kluna, deep; and Klute, moderately wet
Depth to seasonally high water table: mostly 30 to 60 inches (76 to 152 cm) or more
Flooding frequency: occasional

Successional Status

Balsam poplar-white spruce/thinleaf alder open forest is a mid to late seral stage of flood plain succession. This type develops from the Balsam poplar/thinleaf alder open forest.

Riparian-Wetland Status

Classification: riparian

Balsam poplar-white spruce/thinleaf alder open forest
***Populus balsamifera-Picea glauca / Alnus tenuifolia* open forest**
POBA2-PIGL/ALTE2

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T1	92	21	5	40	44
Populus balsamifera	T1	92	24	7	45	47
Picea glauca	T2	33	12	2	15	20
Picea glauca	T3	67	2	1	5	11
Populus balsamifera	T3	33	3	1	10	10
Alnus tenuifolia	S2	100	39	15	85	63
Empetrum nigrum	S4	17	1	1	1	4
Potentilla fruticosa	S3	58	3	1	7	12
Ribes triste	S3	50	24	1	50	35
Rosa acicularis	S3	83	7	1	20	25
Salix alaxensis	S2	42	8	5	15	18
Salix spp.	S3	58	8	1	25	21
Shepherdia canadensis	S3	33	5	1	10	13
Vaccinium uliginosum	S3	33	5	1	10	13
Vaccinium vitis-idaea	S4	25	14	1	40	19
Viburnum edule	S3	17	3	3	3	7
Aconitum delphiniifolium	F	25	1	1	1	5
Anemone spp.	F	17	2	1	2	5
Artemisia tilesii	F	58	6	1	20	19
Aster sibiricus	F	58	5	1	20	17
Astragalus spp.	F	17	1	1	1	3
Epilobium angustifolium	F	58	4	1	15	16
Equisetum spp.	F	83	8	1	40	26
Galium boreale	F	42	2	1	5	9
Geocaulon lividum	F	17	8	1	15	11
Hedysarum alpinum	F	67	4	1	20	17
Linnaea borealis	F	67	4	1	10	15
Mertensia paniculata	F	17	7	3	10	10
Parnassia palustris	F	17	1	1	1	3
Polemonium acutiflorum	F	17	2	1	3	5
Pyrola spp.	F	67	5	1	8	17
Ranunculus spp.	F	17	1	1	1	3
Rubus arcticus	F	42	5	1	7	14
Rubus chamaemorus	F	17	1	1	2	5
Arctagrostis latifolia	G	50	5	1	15	16
Calamagrostis canadensis	G	50	14	1	60	26
Moss layer	M	100	17	3	65	41
Lichen layer	L	92	3	1	10	16
Bare soil	B	50	1	1	5	8
Litter and mulch	B	100	60	3	90	78
Woody litter (>1" dia.)	B	92	16	7	35	38

Salix spp. includes: SALIX, SANO2, SAPL2
Number of stands = 12
ctsumtab

Black spruce/closed sheath cottongrass woodland

***Picea mariana* / *Eriophorum brachyantherum* woodland**

PIMA/ERBR6

(Figures 6, 9, 10, and 11; Plate 7—lower photo)

Description

Black spruce/closed sheath cottongrass woodland consists of woodland to open stands of stunted, small diameter *Picea mariana*. Tree canopy cover ranges from 10 to occasionally 45 percent. In most stands, trees are 10 to 18 feet (3.0 to 5.5 m) in height and 1.5 to 4 inches (4 to 10 cm) in diameter at ground level. Occasional trees up to 35 feet (10.7 m) in height and 6 inches (15 cm) in diameter are in most stands. Tree basal area in Black spruce/closed sheath cottongrass woodland ranges from 5 to 60 feet^2/acre (1.1 to 13.8 m^2/ha) based on 13 sample stands.

Eriophorum brachyantherum tussocks, intermixed with a variety of sedges and low and dwarf shrubs, characterize the understory. In areas of strong tussock development, tussocks range from 9 to 24 inches (23 to 61 cm) in height with spacing between of 8 to 16 inches (20 to 41 cm), and shrubs and other herbs are uncommon. Where tussock development is weaker, low and dwarf shrubs and other sedges codominate. The most frequently occurring sedges are *Carex aquatilis* in wetter microsites and *C. lugens* on higher microsites. Important low and dwarf shrubs include *Ledum* spp., *Vaccinium uliginosum*, *Betula glandulosa*, *V. vitis-idaea*, *Salix planifolia*, and *Empetrum nigrum*. Except for *Rubus chamaemorus* and *Petasites frigidus*, other herbs are uncommon. *R. chamaemorus* forms a moderately open cover in occasional stands. Throughout Black spruce/closed sheath cottongrass woodland, mosses, and in particular *Sphagnum*, cover much of the soil surface and ponded water and saturated conditions are common between the tussocks.

Setting

Distribution and extent: widely distributed throughout the uplands and River corridor; moderate extent

Elevation: 1,850 to 3,000 feet (564 to 914 m)

Landforms: nearly level to occasionally moderately sloping lacustrine terraces and level stream terraces

Principal soils: Kuslinad, very wet; Klasi, very wet; Mendna, very wet; Pergelic Cryohemists; and Haggard (The thickness of the surface organic mat ranges from 8 to 25 inches [20 to 64 cm] in most stands.)

Depth to permafrost: variable; ranges from near the surface to 60 inches (152 cm) or more

Depth to seasonally high water table: variable; ranges from within the organic mat to 60 inches (152 cm) or more; usually perched on the permafrost.

Successional Status

Black spruce/closed sheath cottongrass woodland is late seral vegetation on nearly level to concave sites that have remained undisturbed by wildfire for an extended period of time. This type is usually in association with Low shrub birch/closed sheath cottongrass scrub. These two cover types are transitional with one another and often the break between them is arbitrary.

Riparian-Wetland Status

Classification: Palustrine needle-leafed evergreen scrub-shrub, saturated, organic (*Cowardin et al. 1979*)

Black spruce/closed sheath cottongrass woodland
Picea mariana / *Eriophorum brachyantherum* woodland
PIMA/ERBR6

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea mariana	T2	51	16	10	45	29
Picea mariana	TX	34	20	10	35	26
Picea mariana	T3	47	9	1	25	21
Andromeda polifolia	S4	20	1	1	5	5
Arctostaphylos rubra	S4	36	4	1	15	12
Betula glandulosa	S3	99	16	1	65	40
Chamaedaphne calyculata	S4	13	3	1	10	6
Empetrum nigrum	S4	72	4	1	15	17
Ledum spp.	S3	100	20	2	45	44
Oxycoccus microcarpos	S4	58	1	1	3	6
Salix glauca	S3	18	4	1	15	9
Salix myrtillifolia	S4	30	4	1	15	11
Salix spp.	S3	75	4	1	15	17
Vaccinium uliginosum	S3	99	13	1	55	35
Vaccinium vitis-idaea	S4	96	6	1	20	25
Epilobium angustifolium	F	11	1	1	1	2
Pedicularis labradorica	F	17	1	1	5	4
Petasites frigidus	F	74	4	1	35	17
Rubus chamaemorus	F	79	9	1	40	27
Arctagrostis latifolia	G	64	2	1	6	12
Carex aquatilis	G	22	6	1	15	12
Carex lugens	G	39	10	1	55	20
Carex spp.	G	18	6	1	30	11
Eriophorum brachyantherum	G	97	41	1	80	63
Moss layer	M	100	50	20	100	71
Lichen layer	L	100	12	1	40	35
Bare soil	B	28	2	1	7	7
Litter and mulch	B	100	19	1	50	44
Surface water	B	84	4	1	20	18
Woody litter (>1" dia.)	B	92	2	1	8	12

Salix spp. includes: SABA3, SAPL2
Number of stands = 76
ctsumtab

Low shrub birch scrub

***Betula glandulosa* scrub**

BEGL

(Figures 13, 14, and 15; Plate 12—upper photo)

Description

Low shrub birch scrub consists of moderately open to closed stands of medium and low shrubs dominated by *Betula glandulosa*, *Ledum* spp., and *Vaccinium uliginosum*. Dwarf shrub, primarily *Vaccinium vitis-idaea* and *Empetrum nigrum*, also are usually abundant. *B. glandulosa* is typically 4.5 to 7 feet (1.4 to 2.1 m) in height and forms an irregular, broken upper shrub layer. Other shrubs are usually about 3 feet (0.9 m) in height or less and fill in the spaces between and below the birch. In many stands, *Picea glauca* and/or *P. mariana* saplings, small trees, and relic trees are common to well-represented. Canopy cover of the upper shrub layer ranges from 25 to 70 percent. Total shrub canopy cover is usually between 50 and 90 percent.

In most stands, the herb layer is sparse to open. The number of different herb species is usually fairly high; however, no species are particularly abundant. Important herbs include *Equisetum* spp., *Petasites frigidus*, *Epilobium angustifolium*, *Arctagrostis latifolia*, and *Calamagrostis canadensis*. A mosaic of feathermoss, lichen, and litter covers the ground surface. In some stands on more mesic sites, *Carex lugens* is abundant to very abundant, and lichen is usually considerably more abundant. Most stands show evidence of recent burns, and snags and woody litter are common to well-represented.

Setting

Distribution and extent: widely distributed throughout the uplands; extensive
Elevation: 1,900 to 3,500 feet (579 to 1,067 m)
Landforms: primarily level to moderately steep stream terraces, lacustrine terraces, and hill slopes; steep mountain slopes; all aspects
Principal soils: various (This type occurs on most mineral upland and stream terrace soils in the area and occasionally on organic soils.)
Depth to permafrost: permafrost usually absent; where present, ranges from 0 to 50 inches (0 to 127 cm) or more below the mineral surface
Depth to seasonally high water table: usually greater than 60 inches (greater than 152 cm); many stands with water table at 0 to 40 inches (0 to 102 cm) or deeper

Successional Status

In most places, Low shrub birch scrub appears to be an early, post-fire seral stage leading to Spruce/shrub birch woodland or Spruce/spruce muskeg sedge open forest. Most stands have common to well-represented scattered trees and unburned woodland to reseed the stand, and *Picea glauca* and *P. mariana* seedlings and saplings are common. At higher elevations and on steep slopes, seed trees and seedlings are generally absent to uncommon, suggesting that progression toward the woodland stages in these stands may take a long time. Above about 2,700 feet (823 m), Low shrub birch scrub, where present, is probably the potential vegetation.

The *Carex lugens* understory phase described above appears to be a condition associated with crown fires in which the woodland understory was essentially unburned or only lightly burned. These are the stands which more than likely have permafrost and a water table present in the soil profile.

Riparian-Wetland Status

Classification: usually upland; occasionally Palustrine broad-leaved deciduous scrub-shrub, saturated, mineral and organic (*Cowardin et al. 1979*)

Low shrub birch scrub

***Betula glandulosa* scrub**

BEGL

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T1	30	5	1	15	12
Picea glauca	T2	42	4	1	10	12
Picea mariana	T2	13	5	2	10	8
Picea glauca	T3	53	8	1	30	21
Picea mariana	T3	20	5	1	15	10
Arctostaphylos rubra	S4	37	4	1	10	12
Betula glandulosa	SM	97	46	3	90	67
Empetrum nigrum	S4	77	4	1	15	18
Ledum spp.	S3	98	24	1	75	48
Potentilla fruticosa	S3	25	3	1	10	8
Rosa acicularis	S3	30	1	1	5	6
Salix glauca	SM	42	8	1	25	19
Salix myrtillifolia	S4	32	5	1	15	13
Salix reticulata	S4	22	1	1	5	6
Salix spp.	SM	77	5	1	14	19
Shepherdia canadensis	S3	12	5	1	20	7
Spiraea beauverdiana	S3	13	3	1	10	6
Vaccinium uliginosum	S3	100	21	1	60	46
Vaccinium vitis-idaea	S4	93	7	1	50	26
Cornus canadensis	F	18	2	1	5	5
Epilobium angustifolium	F	40	1	1	5	6
Equisetum spp.	F	27	8	1	65	14
Pedicularis labradorica	F	27	1	1	1	4
Petasites frigidus	F	57	3	1	10	13
Rubus chamaemorus	F	35	2	1	10	9
Arctagrostis latifolia	G	57	3	1	15	13
Calamagrostis canadensis	G	22	4	1	20	9
Carex lugens	G	50	30	1	85	39
Carex spp.	G	18	2	1	7	6
Eriophorum brachyantherum	G	13	2	1	5	5
Festuca altaica	G	22	2	1	5	7
Moss layer	M	100	41	5	85	64
Lichen layer	L	100	15	1	70	39
Bare soil	B	55	3	1	15	12
Litter and mulch	B	93	15	1	60	37
Rock fragments	B	17	2	1	15	6
Surface water	B	25	1	1	3	5
Woody litter (>1" dia.)	B	58	3	1	10	12

Salix spp. includes: SABA3, SAMO2, SAPL2
Number of stands = 60
ctsumtab

Low shrub birch/closed sheath cottongrass scrub

***Betula glandulosa* / *Eriophorum brachyantherum* scrub**

BEGL/ERBR6

(Figure 11)

Description

Low shrub birch/closed sheath cottongrass scrub is dominated by moderately dense to dense *Eriophorum brachyantherum* tussocks, with an open to moderately closed overstory of low and dwarf shrubs and scattered stunted trees and tree regeneration. Tussock cover ranges from 25 to 85 percent. In areas of the best development, tussocks range from 9 to 30 inches (23 to 76 cm) in height with spacing between tussocks of 8 to 16 inches (20 to 41 cm). Where tussock development is weaker, other sedges are common among the tussocks. The most frequently occurring sedges are *Carex aquatilis* and *C. lugens*.

Canopy cover of the scrub layer typically ranges from 20 to 60 percent. In some stands with weak tussock development, scrub cover occasionally exceeds 75 percent. Important low and dwarf shrubs include *Betula glandulosa*, *Ledum* spp., *Vaccinium uliginosum*, *V. vitis-idaea*, *Salix planifolia*, and *Andromeda polifolia* in some stands. *Picea mariana,* and to a lesser extent *P. glauca,* are common in most stands. Trees are usually less than 15 feet (less than 4.6 m) in height and form less than 10 percent canopy cover. Tree regeneration is well-represented in some stands.

Except for *Rubus chamaemorus*, *Petasites frigidus*, and *Arctagrostis latifolia*, other herbs are uncommon in Low shrub birch/closed sheath cottongrass scrub. *R. chamaemorus* forms a moderately open cover in occasional stands. Throughout Low shrub birch/closed sheath cottongrass scrub, mosses, in particular *Sphagnum*, cover much of the soil surface, and ponded water and saturated conditions are common between the tussocks.

Setting

Distribution and extent: widely distributed throughout the uplands and river corridor; moderate extent

Elevation: 1,850 to 3,000 feet (564 to 914 m)

Landforms: nearly level to occasionally moderately sloping lacustrine terraces and level stream terraces

Principal soils: Kuslinad, very wet; Mendna, very wet; Pergelic Cryohemists; and Haggard (The thickness of the surface organic mat ranges from 8 to as much as 60 inches (20 to as much as 152 cm) in most stands.)

Depth to permafrost: variable; ranges from near the surface to 60 inches (152 cm) or more

Depth to seasonally high water table: variable; ranges from just below the surface to 60 inches (152 cm) or more; usually perched on the permafrost

Successional Status

Low shrub birch/closed sheath cottongrass scrub is probably late seral vegetation on nearly level and concave sites that have remained undisturbed by wildfire for an extended period of time. In many places, this type is a seral stage leading to Black spruce/ closed sheath cottongrass woodland. Both types are often in association with one another on the same landforms and soils. These two cover types are transitional with one another and often the break between them is arbitrary.

Riparian-Wetland Status

Classification: Palustrine needle-leafed evergreen scrub-shrub, saturated, organic (*Cowardin et al. 1979*)

Low shrub birch/closed sheath cottongrass scrub

***Betula glandulosa / Eriophorum brachyantherum* scrub**

BEGL/ERBR6

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T2	17	3	2	6	7
Picea mariana	T2	36	4	1	10	12
Picea glauca	T3	19	6	3	15	10
Picea mariana	T3	56	14	1	35	28
Picea spp.	T3	11	5	1	10	8
Andromeda polifolia	S4	25	9	1	35	15
Arctostaphylos rubra	SS	33	5	1	15	13
Betula glandulosa	S3	100	24	2	90	49
Chamaedaphne calyculata	S4	22	7	1	15	12
Empetrum nigrum	S4	44	4	1	15	14
Ledum spp.	S3	97	18	4	55	42
Oxycoccus microcarpos	S4	42	1	1	1	5
Potentilla fruticosa	S3	19	2	1	5	6
Salix myrtillifolia	S4	28	3	1	8	9
Salix spp.	S3	72	4	1	10	17
Vaccinium uliginosum	S4	100	11	1	30	33
Vaccinium vitis-idaea	S4	89	6	1	65	23
Pedicularis labradorica	F	22	1	1	1	3
Petasites frigidus	F	47	3	1	8	13
Rubus chamaemorus	F	86	5	1	25	20
Arctagrostis latifolia	G	44	4	1	10	13
Carex aquatilis	G	31	13	1	40	20
Carex lugens	G	22	10	1	35	15
Carex spp.	G	22	8	1	20	13
Eriophorum brachyantherum	G	92	49	3	85	67
Moss layer	M	100	36	5	70	60
Lichen layer	L	92	12	1	35	33
Bare soil	B	33	4	1	35	12
Litter and mulch	B	100	22	1	60	47
Surface water	B	64	7	1	35	21
Woody litter (>1" dia.)	B	78	1	1	3	8

Salix spp. includes: SABA3, SAPL2
Eriophorum branchyantherum includes E. vaginatum
Number of stands = 36
ctsumtab

Low shrub birch/lichen scrub

***Betula glandulosa* / lichen scrub**

BEGL/lichen

(Figures 8, 14, and 15; Plates 1, and 12—upper photo)

Description

Low shrub birch/lichen scrub consists of moderately open to closed stands of medium and low shrubs dominated by *Betula glandulosa*, *Ledum* spp., *Vaccinium uliginosum*, and *Salix* spp., with abundant to very abundant fruticose lichens in the ground layer. Dwarf shrub, primarily *Vaccinium vitis-idaea* and *Empetrum nigrum*, are also usually well-represented to abundant. *B. glandulosa* is typically 3.5 to 5.5 feet (1.1 to 1.8 m) in height and forms a nearly continuous open to moderately closed upper shrub layer. Other shrubs are usually about 3 feet (0.9 m) in height or less and fill in the spaces between and below the birch. In many stands, *Picea glauca* and/or *P. mariana* saplings, small trees, and relic trees are common to well-represented. Total shrub canopy cover is usually between 50 and 90 percent.

Abundant to very abundant lichen cover, patches of mosses, and litter characterize the aspect of the ground layer. In most stands, the herb layer is sparse to occasionally open and the number of herb species is low. An important herb in many stands is *Festuca altaica*. Other frequently occurring herbs include *Epilobium angustifolium*, *Pedicularis labradorica*, *Senecio* spp., *Petasites frigidus*, *Arctagrostis latifolia*, and *Calamagrostis canadensis*. Most stands show evidence of recent burns, and snags and woody litter are common to well-represented.

Setting

Distribution and extent: widely distributed throughout the uplands, primarily at higher elevations; moderately extensive

Elevation: 2,300 to 3,500 feet (701 to 1,067 m)

Landforms: nearly level to steep hill slopes, alluvial fans, and pitted outwash plains; occasionally on lacustrine terraces and stream terraces; all aspects

Principal soils: Pippod; Chistna; Chelina; Cobblank, cool; Goodview; and Maclaren (This type occurs mostly on coarse textured, well drained to excessively well drained soils with less than 5 inches [less than 13 cm] of surface organic mat.)

Depth to permafrost: permafrost almost always absent

Depth to seasonally high water table: greater than 60 inches (greater than 152 cm)

Successional Status

In most places, Low shrub birch scrub is an early, post-fire seral stage leading to Spruce/lichen woodland and Spruce/shrub birch woodland. It appears to develop only on relatively xeric sites or other sites that have been moderately to severely burned. Most stands have common to well-represented scattered trees and unburned woodland to reseed the stand. *Picea glauca* and *P. mariana* seedlings and saplings are common in most stands. On pitted outwash plains and hills in the vicinity of Dickey Lake and at higher elevations in the subalpine zone, this type probably is late seral or potential vegetation.

Riparian-Wetland Status

Classification: upland

Low shrub birch/lichen scrub
Betula glandulosa / lichen scrub
BEGL/lichen

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T1	27	4	1	7	10
Picea glauca	T2	35	5	1	15	14
Picea glauca	T3	77	3	1	15	15
Picea mariana	T3	12	4	1	5	6
Arctostaphylos rubra	S4	35	2	1	7	9
Betula glandulosa	SM	100	56	10	85	75
Empetrum nigrum	S4	81	4	1	15	19
Ledum spp.	S3	85	22	1	60	43
Potentilla fruticosa	S3	15	1	1	1	3
Rosa acicularis	S3	23	1	1	1	4
Salix glauca	SM	42	4	1	10	13
Salix myrtillifolia	S4	35	2	1	5	9
Salix reticulata	S4	12	4	2	7	7
Salix spp.	S3	81	5	1	20	19
Vaccinium uliginosum	S3	88	12	1	40	33
Vaccinium vitis-idaea	S4	92	6	1	20	23
Aconitum delphiniifolium	F	12	1	1	1	3
Artemisia arctica	F	19	2	1	5	6
Cornus canadensis	F	23	1	1	3	5
Epilobium angustifolium	F	38	1	1	1	5
Equisetum spp.	F	19	3	1	10	7
Gentiana spp.	F	12	1	1	1	2
Lupinus arcticus	F	15	2	1	5	6
Lycopodium spp.	F	15	1	1	1	3
Pedicularis labradorica	F	35	1	1	1	5
Petasites frigidus	F	23	1	1	5	6
Polemonium acutiflorum	F	12	1	1	2	3
Rubus arcticus	F	27	2	1	4	6
Senecio spp.	F	31	1	1	1	4
Agrostis scabra	G	12	1	1	1	2
Arctagrostis latifolia	G	31	2	1	5	7
Calamagrostis canadensis	G	23	2	1	5	7
Carex spp.	G	50	2	1	7	11
Festuca altaica	G	38	10	1	20	20
Poa spp.	G	12	1	1	2	3
Moss layer	M	100	27	5	55	52
Lichen layer	L	100	43	5	70	65
Bare soil	B	50	3	1	10	12
Litter and mulch	B	100	10	1	30	32
Rock fragments	B	31	2	1	10	9
Woody litter (>1" dia.)	B	42	3	1	10	11

Salix spp. includes: SABA3, SAPL2
Number of stands = 26
ctsumtab

Low shrub birch-willow/water sedge scrub
***Betula glandulosa*-*Salix* spp. / *Carex aquatilis* scrub**
BEGL-SAPL2/CAAQ
(Plate 8—upper photo)

Description

Low shrub birch-willow/water sedge scrub consists of open to occasionally closed stands of mixed *Betula glandulosa* and *Salix planifolia* 2 to 6 feet (0.6 to 1.8 m) in height. In many stands, either *B. glandulosa* or *S. planifolia* is rare to absent. Other occasional to frequent low willows and shrubs include *Potentilla fruticosa*, *Vaccinium uliginosum*, *Ledum* spp., and *Chamaedaphne calyculata*. Scattered dwarf shrubs, including *S. reticulata*, *S. fuscescens*, *Empetrum nigrum* and *Arctostaphylos rubra*, are common in most stands. Low shrub canopy cover ranges from 40 to occasionally 90 percent. In many stands, particularly along the edges with adjacent types, *Picea glauca* and, to a lesser degree, *P. mariana* are common, often forming a stunted woodland overstory.

Below the shrub layer, *Carex aquatilis* and other tall, bright green *Carex* spp. and *Calamagrostis canadensis* dominate the aspect of this type. *C. canadensis* is usually as tall as, and intermixed with, the shrub layer while the *Carex* spp. are generally somewhat shorter. *Eriophorum angustifolium* and *E. brachyantherum* are common to well-represented in some stands. Except for *Equisetum* spp. and *Potentilla palustris*, other herbs are generally of relatively minor importance. Mosses are abundant in most stands and slowly flowing and standing water covers a large portion of the ground surface, particularly early in the growing season.

Setting

Distribution and extent: widely distributed throughout the uplands and river corridor; minor extent
Elevation: 1,900 to 3,000 feet (579 to 915 m)
Landforms: nearly level to moderately sloping, weakly developed drainage networks and margins of depressions on broadly concave lacustrine terraces; frequently in depressions and old channels on stream terraces
Principal soils: Ewan, Mendna, and Pergelic Cryohemists
Depth to permafrost: usually greater than 60 inches (greater than 152 cm); occasionally from 16 to 60 inches (41 to 152 cm)
Depth to seasonally high water table: ponded in spring and early summer; 0 to 6 inches (0 to 15 cm) in summer and fall

Successional Status

Low shrub birch-willow/water sedge scrub appears to be late seral or potential vegetation in areas with slow moving or aerated water. This type usually occurs adjacent to, or intermixed with, Sedge wet meadow and Spruce/water sedge woodland, with which it shares many vegetative characteristics and site properties.

Riparian-Wetland Status

Classification: Palustrine broad-leaved deciduous scrub-shrub, semi-permanently flooded, mineral and organic (*Cowardin et al. 1979*)

Low shrub birch-willow/water sedge scrub
Betula glandulosa-Salix spp. / *Carex aquatilis* scrub
BEGL-SAPL2/CAAQ

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T1	12	4	1	7	6
Picea glauca	T2	20	4	1	10	9
Picea glauca	T3	44	1	1	4	8
Picea mariana	T3	20	2	1	5	7
Alnus tenuifolia	S2	12	3	1	7	6
Betula glandulosa	SM	88	17	1	55	39
Chamaedaphne calyculata	S3	20	11	1	45	15
Empetrum nigrum	S4	24	1	1	1	4
Ledum spp.	S3	48	3	1	5	11
Oxycoccus microcarpos	S4	32	1	1	1	4
Potentilla fruticosa	S3	48	2	1	10	11
Salix fuscescens	S4	12	2	1	2	4
Salix reticulata	S4	24	7	2	15	13
Salix spp.	SM	96	24	1	65	48
Vaccinium uliginosum	S3	52	7	1	30	19
Vaccinium vitis-idaea	S4	20	1	1	2	4
Aconitum delphiniifolium	F	12	2	1	2	4
Epilobium angustifolium	F	16	5	1	15	9
Equisetum fluviatile	F	16	3	1	10	7
Equisetum spp.	F	40	4	1	15	12
Parnassia palustris	F	12	3	2	5	6
Pedicularis labradorica	F	12	2	1	5	5
Petasites frigidus	F	28	4	1	10	10
Polemonium acutiflorum	F	28	2	1	7	7
Potentilla palustris	F	56	9	1	25	23
Rubus arcticus	F	36	1	1	5	6
Rubus chamaemorus	F	12	2	1	2	4
Rumex arcticus	F	20	1	1	2	5
Stellaria spp.	F	12	1	1	1	2
Viola spp.	F	20	1	1	3	4
Arctagrostis latifolia	G	16	2	1	4	5
Calamagrostis canadensis	G	40	10	1	40	20
Carex aquatilis	G	76	54	10	90	64
Carex spp.	G	40	23	1	55	30
Eriophorum spp.	G	24	4	1	10	10
Moss layer	M	100	37	1	75	61
Lichen layer	L	64	3	1	15	13
Bare soil	B	28	5	1	30	12
Litter and mulch	B	100	18	1	70	42
Surface water	B	88	22	1	95	44
Woody litter (>1" dia.)	B	48	4	1	10	14

Salix spp. includes: SABA3, SAMO2, SANO2, SAPL2
Number of stands = 25
ctsumtab

Low willow/herb scrub

***Salix* spp. / herb scrub**

SALIX/herb

(Figures 3, 4, and 9; Plates 2—lower photo and 3—upper photo)

Description

Low willow/herb scrub consists of moderately open to closed willow 2 to 7 feet (0.6 to 2.1 m) in height with a moderately closed to closed herb layer. Low shrub canopy cover ranges from 40 to 95 percent. Dominant shrubs include *Salix planifolia*, *S. barclayi*, and often *S. monticola*. *S. alaxensis* forms an open tall shrub layer in some stands. Other low shrubs are relatively unimportant except for *Potentilla fruticosa* and *Vaccinium uliginosum*. In most stands, the herb layer is composed of a rich variety of species. Herb and dwarf shrub canopy cover is typically greater than 80 percent. Occasionally the herb layer is only sparse to open. Important herbs include *Calamagrostis canadensis*, *Epilobium angustifolium*, *Equisetum* spp., *Mertensia paniculata*, *Polemonium acutiflorum*, *Swertia perennis*, and often *Carex aquatilis*. *Rubus arcticus* and *Salix reticulata* are common dwarf shrubs in many stands. The ground surface is covered with feathermoss patches and herbaceous and woody litter.

Setting

Distribution and extent: river corridor throughout the survey area; primarily the Middle Fork, Main Stem north of Canyon Rapids, and the upper reaches of the North and South Branches; moderate extent

Elevation: 1,950 to 2,900 feet (594 to 884 m)

Landforms: level to occasionally moderately sloping flood plains and low stream terraces; terrace height usually less than about 4 feet (less than about 1.2 m)

Principal soils: Dackey, cool; Tangoe; Swedna, high elevation; Swedna; and Ogtna

Depth to seasonally high water table: variable; mostly 10 to 40 inches (25 to 102 cm)

Flooding frequency: frequent to occasional

Successional Status

Low willow/herb scrub occurs from above treeline down into the forest zone, and successional status varies from potential to early seral vegetation depending on the site. Within the forest zone, most stands have uncommon to common *Picea glauca* and often *Populus balsamifera* seedlings, saplings, and small trees. With forest development, terrace height usually increases from channel migration and down-cutting. Flooding frequency decreases and the soils become better drained. Along the Middle Fork immediately below Dickey Lake, Low willow/herb scrub is potential vegetation or possibly seral to Low shrub birch scrub, which replaces the willow on stream terraces as terrace height increases and periodic flooding ceases.

In many places, Low willow/herb scrub occurs in close proximity with, and is transitional to, Low willow/water sedge scrub. Flooding is less frequent and of shorter duration in Low willow/herb scrub compared with Low willow/water sedge scrub. Also, surface ponding is less prevalent in Low willow/herb scrub.

Riparian-Wetland Status

Classification: mostly Palustrine scrub-shrub, seasonally flooded, mineral (*Cowardin et al. 1979*); riparian

Low willow/herb scrub
Salix spp. / herb scrub
SALIX/herb

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T2	40	3	1	10	12
Picea glauca	T3	50	3	1	15	13
Betula glandulosa	S3	26	4	1	15	10
Potentilla fruticosa	S3	86	7	1	20	24
Salix alaxensis	S2	29	11	3	35	17
Salix myrtillifolia	S4	14	4	1	10	7
Salix reticulata	S4	33	10	1	40	18
Salix spp.	S3	100	75	40	95	87
Vaccinium uliginosum	S3	50	7	1	15	18
Aconitum delphiniifolium	F	40	1	1	3	6
Anemone spp.	F	21	1	1	7	5
Artemisia tilesii	F	17	2	1	5	5
Aster sibiricus	F	26	3	1	7	9
Astragalus spp.	F	31	5	1	20	13
Cornus canadensis	F	19	2	1	5	6
Epilobium angustifolium	F	60	5	1	45	18
Equisetum spp.	F	50	11	1	75	23
Galium boreale	F	36	1	1	5	7
Gentiana spp.	F	12	1	1	1	3
Hedysarum alpinum	F	33	4	1	20	12
Mertensia paniculata	F	24	4	1	15	10
Parnassia palustris	F	55	1	1	3	7
Petasites frigidus	F	24	3	1	10	9
Polemonium acutiflorum	F	67	2	1	10	11
Polygonum viviparum	F	14	1	1	2	3
Potentilla palustris	F	14	1	1	2	4
Rubus arcticus	F	79	3	1	25	16
Sanguisorba stipulata	F	26	4	1	20	10
Swertia perennis	F	52	2	1	10	10
Valeriana spp.	F	26	3	1	10	8
Viola spp.	F	31	1	1	2	5
Agrostis scabra	G	17	1	1	3	4
Arctagrostis latifolia	G	45	4	1	10	13
Calamagrostis canadensis	G	79	8	1	30	25
Carex aquatilis	G	36	4	1	20	12
Carex spp.	G	36	2	1	5	8
Poa spp.	G	29	1	1	5	6
Moss layer	M	98	30	1	85	54
Lichen layer	L	71	4	1	15	17
Bare soil	B	60	7	1	70	21
Litter and mulch	B	100	32	1	85	56
Rock fragments	B	17	1	1	1	3
Surface water	B	14	3	1	5	7
Woody litter (>1" dia.)	B	50	4	1	10	13

Salix spp. includes: SABA3, SAMO2, SANO2, SAPL2
Number of stands = 42
ctsumtab

Low willow/herb2 scrub

***Salix* spp. / herb2 scrub**

SALIX/herb2

(Figure 7; Plate 4)

Description

Low willow/herb2 scrub consists of open to moderately closed willow, usually 3 to 5 feet (0.9 to 1.5 m) in height over a moderately closed to closed layer of herbs. Low shrub canopy cover ranges from 25 to 65 percent, and the shrubs tend to be irregularly distributed in thickets and patches. *Salix alaxensis* is the most important shrub, although *S. barclayi* and *S. planifolia* are common in many stands. Shrubs other than willows are rare to absent. The herb layer is composed of a rich variety of grasses and large forbs. Herb canopy cover is usually 90 percent or more. The most important herbs include *Calamagrostis canadensis*, *Agropyron trachycaulum*, *Mertensia paniculata*, *Equisetum* spp., *Epilobium angustifolium*, *Poa* spp., and *Artemisia tilesii*. Litter is abundant on the ground surface.

Setting

Distribution and extent: restricted to the lower Middle Fork; minor extent
Elevation: 2,450 to 2,500 feet (747 to 762 m)
Landforms: exteriors of point bars on nearly level flood plains; terrace height from 3 to 12 feet (0.9 to 3.7 m); abrupt, steep drop of the river bank to the channel, in most places
Principal soils: Sankluna
Depth to seasonally high water table: 48 to 60 inches (123 to 152 cm) or more
Flooding frequency: occasional; frequent adjacent to the channel

Successional Status

The successional status of Low willow/herb2 scrub, relative to the adjacent White spruce/willow open forest on higher flood plains, is uncertain. In the forest understory, the dominant willows include *Salix planifolia* and *S. Barclayi,* while *S. alaxensis* is rare to absent—opposite to that occurring in the willow scrub vegetation. The forested soils also have permafrost within about 30 inches (76 cm) of the surface. On those point bars observed during field work, the transition between the low willow scrub and white spruce forest usually occurred over a distance of less than 10 feet (less than 3 m) and, except for an increase in *S. barclayi* in some stands, intermediate seral stages (and soil conditions) were not observed.

Along the edge with the river channel, Low willow/ herb2 scrub is often transitional to Sedge-grass riparian meadow. The point bars rise rapidly from the channel edge so that the permanently wetted zone suitable for the riparian meadow type is usually very narrow.

Riparian-Wetland Status

Classification: riparian

Low willow/herb2 scrub
Salix spp. / herb2 scrub
SALIX/herb2

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T3	80	1	1	1	6
Potentilla fruticosa	S3	20	1	1	1	3
Salix alaxensis	S3	100	38	25	60	62
Salix spp.	S3	80	6	1	17	23
Aconitum delphiniifolium	F	60	1	1	1	6
Anemone spp.	F	20	1	1	1	3
Artemisia tilesii	F	100	2	1	5	13
Aster sibiricus	F	100	3	1	7	16
Delphinium glaucum	F	20	1	1	1	3
Epilobium angustifolium	F	100	5	2	15	23
Epilobium palustre	F	20	1	1	1	3
Equisetum fluviatile	F	20	1	1	1	3
Equisetum spp.	F	100	12	3	20	34
Galium boreale	F	60	1	1	1	7
Hedysarum alpinum	F	40	2	1	2	8
Mertensia paniculata	F	100	16	4	40	40
Parnassia palustris	F	60	1	1	1	5
Polemonium acutiflorum	F	60	3	1	7	13
Rorippa hispida	F	40	1	1	1	4
Rubus arcticus	F	60	2	1	5	11
Rumex arcticus	F	20	1	1	1	3
Sanguisorba stipulata	F	20	1	1	1	4
Stellaria spp.	F	40	1	1	1	4
Thalictrum sparsiflorum	F	20	1	1	1	3
Veronica spp.	F	20	1	1	1	3
Agropyron spp.	G	80	11	1	20	30
Agropyron trachycaulum	G	20	7	7	7	12
Agrostis scabra	G	80	2	1	4	11
Alopecurus aequalis	G	20	1	1	1	4
Arctagrostis latifolia	G	60	5	1	10	18
Calamagrostis canadensis	G	80	39	15	60	56
Carex aquatilis	G	40	2	1	3	9
Carex spp.	G	80	1	1	3	10
Hierochloe odorata	G	80	6	2	10	22
Juncus spp.	G	20	1	1	1	3
Melica spp.	G	20	5	5	5	10
Poa spp.	G	80	15	3	50	34
Trisetum spicatum	G	40	1	1	1	5
Moss layer	M	60	4	1	5	14
Litter and mulch	B	100	50	5	85	71
Woody litter (>1" dia.)	B	20	2	2	2	6

Salix spp. includes: SABA3, SAMO2, SAPL2
Number of stands = 5
ctsumtab

Low willow/water sedge scrub
***Salix* spp. / *Carex aquatilis* scrub**
SALIX/CAAQ
(Figure 2; Plates 2—upper photo and 3—lower photo)

Description

Low willow/water sedge scrub consists of occasionally open to closed willow 2 to 4 feet (0.6 to 1.2 m) in height, with a moderately open to closed layer of water sedge in the understory. Ponded water is common to well-represented on the ground surface.

Shrub canopy cover typically ranges from 50 to 90 percent, although it is frequently less in stands transitional to the sedge-grass riparian meadow cover type. Dominant willows include *Salix planifolia* and *S. barclayi*. Other shrubs are relatively unimportant except for *Potential fruticosa*, which is common in most stands. Canopy cover of the herbaceous layer is variable but usually ranges from 50 to over 75 percent. *Carex aquatilis* is the dominant herb; other herbs are usually of minor importance. Frequently occurring species include *Calamagrostis canadensis*, *Potential palustris*, and *Salix reticulata* and *Rubus arcticus* on slightly elevated microsites. Aquatic mosses are usually abundant in low microsites.

Setting

Distribution and extent: river corridor; primarily the upper Middle Fork, occasional on the lower Middle Fork and Main Stem north of Canyon Rapids; moderate extent
Elevation: 2,350 to 2,900 feet (716 to 884 m)
Landforms: level to occasionally moderately sloping flood plains; terrace height generally less than about 5 feet (less than about 1.5 m)
Principal soils: Swedna, high elevation; Hisna; and Tangoe, wet, frequently flooded
Depth to seasonally high water table: 0 to 20 inches (0 to 51 cm); extensive ponding during much of the growing season
Flooding frequency: frequent to occasional

Successional Status

Low willow/water sedge scrub is generally too wet for tree growth. Where it occurs, this cover type is presumably potential vegetation.

Towards the wet extreme of the type, Low willow/water sedge is transitional to Sedge-grass riparian meadow. Willow canopy cover drops to as little as 25 percent and the distinction between the scrub and meadow types becomes arbitrary.

In many places, site conditions favorable to Low willow/water sedge scrub appear to be maintained by beaver activity. Elsewhere, conditions are maintained by proximity to the river channel. A change in beaver activity or down-cutting or migration of the channel improves drainage and could cause a succession of the vegetation toward Low willow/herb scrub.

Riparian-Wetland Status

Classification: Palustrine scrub-shrub, semi-permanently flooded, mineral (*Cowardin et al. 1979*); riparian

Low willow/water sedge scrub
Salix spp. / *Carex aquatilis* scrub
SALIX/CAAQ

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T2	27	4	1	7	10
Picea glauca	T3	27	5	1	15	11
Alnus tenuifolia	SS	13	10	5	15	12
Arctostaphylos rubra	SS	13	3	1	5	6
Betula glandulosa	SS	20	3	1	7	7
Potentilla fruticosa	SS	93	6	1	15	24
Salix myrtillifolia	SS	13	1	1	1	3
Salix reticulata	SS	60	20	3	60	34
Salix spp.	SS	100	66	25	90	81
Vaccinium uliginosum	SS	60	7	1	20	20
Anemone spp.	F	27	1	1	1	4
Astragalus spp.	F	13	1	1	1	3
Epilobium angustifolium	F	33	1	1	2	5
Equisetum spp.	F	20	6	1	15	11
Hedysarum alpinum	F	13	2	1	3	5
Parnassia palustris	F	60	1	1	1	6
Petasites frigidus	F	27	1	1	3	5
Polemonium acutiflorum	F	67	1	1	2	8
Potentilla palustris	F	47	8	1	25	19
Rubus arcticus	F	80	3	1	15	15
Rubus chamaemorus	F	13	2	1	3	5
Rumex arcticus	F	33	4	1	8	12
Sedum rosea ssp. integrifolium	F	13	1	1	1	3
Swertia perennis	F	53	2	1	7	10
Valeriana spp.	F	33	1	1	2	5
Viola spp.	F	13	1	1	1	3
Agrostis scabra	G	13	1	1	1	3
Arctagrostis latifolia	G	40	3	1	10	10
Calamagrostis canadensis	G	67	6	1	15	20
Carex aquatilis	G	87	35	7	80	55
Carex spp.	G	33	15	1	60	23
Hierochloe odorata	G	13	4	3	4	7
Juncus spp.	G	13	1	1	1	3
Poa spp.	G	40	1	1	4	7
Moss layer	M	100	44	10	90	66
Lichen layer	L	93	3	1	10	16
Bare soil	B	53	2	1	5	10
Litter and mulch	B	100	32	1	70	57
Rock fragments	B	20	1	1	1	3
Surface water	B	80	10	1	35	28
Woody litter (>1" dia.)	B	47	3	1	7	11

Salix spp. includes: SABA3, SAMO2, SAPL2
Number of stands = 15
ctsumtab

Quaking aspen forest
***Populus tremuloides* forest**
POTR5

Description

Quaking aspen forest consists of moderately open to closed stands of *Populus tremuloides* and common *Picea glauca* and/or *P. mariana*. Tree canopy cover ranges from 50 to 80 percent. *Populus tremuloides* trees are often relatively short and poorly formed with open, sparsely limbed crowns. On steep escarpments, the lower bole is frequently crooked or bowed from soil creep.

The understory varies considerably but in most stands is dominated by scattered shrubs and sparse herbs. Frequently occurring shrubs include *Shepherdia canadensis*, *Rosa acicularis*, *Vaccinium uliginosum*, *V. vitis-idaea*, and *Arctostaphylos uva-ursi*. Many stands have common tall and medium *Salix* spp. Herbs are generally sparse; frequently occurring species include *Epilobium angustifolium*, *Geocaulon lividum*, *Linnaea borealis*, and *Festuca altaica*. Woody debris and other litter and small, scattered patches of moss and lichen cover the ground surface.

Setting

Distribution and extent: scattered locations on the Main Stem and West Fork; minor extent
Elevation: 1,900 to 2,500 feet (579 to 762 m)
Landforms: moderately sloping to very steep escarpments and hill slopes; outwash and strandline deposits
Principal soils: Chistna and Cryochrepts (The surface organic mat is usually less than one inch [less than 2.5 cm]. Coarse soil texture, steep slopes, and/or convex slope shape result in dry growing conditions.)
Depth to permafrost: greater than 60 inches (greater than 152 cm)
Depth to seasonally high water table: greater than 60 inches (greater than 152 cm)

Successional Status

Where present, quaking aspen appears to be a mid to late seral stage. On escarpments and other very steep slopes, this type is usually on upper, convex positions and may be the potential for these sites. Elsewhere, continued succession may lead to either a *Picea glauca* or *P. mariana* dominated stand or mixed stands of *Picea* spp. and *Populus tremuloides*. Recurring wildfires probably destroy the stands before succession can advance to a later spruce stage.

Wetland Status

Classification: upland

Quaking aspen forest
***Populus tremuloides* forest**
POTR5

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T1	50	5	5	5	16
Picea mariana	T1	50	10	10	10	22
Populus tremuloides	T1	100	55	45	65	74
Populus tremuloides	T3	100	2	1	3	13
Arctostaphylos uva-ursi	S4	50	1	1	1	7
Empetrum nigrum	S4	50	1	1	1	5
Ledum spp.	S3	50	2	2	2	10
Rosa acicularis	S3	100	8	1	15	28
Salix glauca	S2	50	3	3	3	12
Salix planifolia	S3	50	3	3	3	12
Shepherdia canadensis	S3	50	5	5	5	16
Vaccinium uliginosum	S3	50	4	4	4	14
Vaccinium vitis-idaea	S4	50	2	2	2	10
Cornus canadensis	F	50	7	7	7	19
Epilobium angustifolium	F	100	3	1	5	17
Equisetum spp.	F	50	4	4	4	14
Gentiana spp.	F	50	1	1	1	5
Geocaulon lividum	F	50	7	7	7	19
Linnaea borealis	F	50	1	1	1	7
Lupinus arcticus	F	50	1	1	1	5
Lycopodium spp.	F	50	1	1	1	5
Mertensia paniculata	F	50	1	1	1	5
Pedicularis labradorica	F	50	1	1	1	5
Carex spp.	G	50	1	1	1	7
Elymus spp.	G	50	5	5	5	16
Festuca altaica	G	50	1	1	1	7
Poa spp.	G	50	1	1	1	5
Moss layer	M	100	1	1	2	11
Lichen layer	L	100	1	1	2	11
Bare soil	B	50	10	10	10	22
Litter and mulch	B	100	33	5	60	57
Woody litter (>1" dia.)	B	50	5	5	5	16

Number of stands = 2
ctsumtab

Quaking aspen-white spruce forest
***Populus tremuloides*-*Picea glauca* forest**
POTR5-PIGL

Description

Quaking aspen-white spruce forest consists of moderately open to closed stands of mixed *Populus tremuloides* and *Picea glauca*. In many stands, *Picea glauca* is primarily a subdominant tree in the lower canopy layer. *Picea mariana* is the dominant spruce in occasional stands. Tree canopy cover ranges from 40 to 80 percent.

The understory of Quaking aspen-white spruce forest varies considerably but in most stands is dominated by scattered shrubs and sparse herbs. Frequently occurring shrubs include *Shepherdia canadensis*, *Rosa acicularis*, *Ledum* spp., *Vaccinium uliginosum*, *V. vitis-idaea*, and *Arctostaphylos uva-ursi*. Many stands have common tall *Salix bebbiana* and *S. glauca*.

Herb cover is generally sparse; commonly occurring species include *Epilobium angustifolium*, *Geocaulon lividum*, *Linnaea borealis*, and *Festuca altaica*. Woody debris and other litter and small, scattered patches of moss and lichen cover the ground surface.

Setting

Distribution and extent: scattered locations on the Main Stem and West Fork; minor extent
Elevation: 1,900 to 2,500 feet (579 to 762 m)
Landforms: moderately sloping to very steep escarpments and hill slopes; outwash and strandline deposits
Principal soils: Chistna, Pippod, Cryochrepts, and Cryorthents (The thickness of the surface organic mat is usually 2 inches [5 cm] or less. Coarse soil texture, steep slopes, and/or convex slope shape result in dry growing conditions.)
Depth to permafrost: greater than 60 inches (greater than 152 cm)
Depth to seasonally high water table: greater than 60 inches (greater than 152 cm)

Successional Status

Where present, Quaking aspen-white spruce forest is a persistent, mid to late seral stage. On escarpments and other very steep slopes, this type is usually on upper, convex positions. The presence of both *Populus tremuloides* and *Picea glauca* regeneration suggests that mixed stands are probably the potential. On outwash and strandline deposits, the potential is uncertain. Recurring wildfires probably destroy stands before succession can advance to a later spruce stage.

Riparian-Wetland Status

Classification: upland

Quaking aspen-white spruce forest
Populus tremuloides-Picea glauca forest
POTR5-PIGL

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T1	100	24	1	35	49
Populus balsamifera	T1	11	1	1	1	3
Populus tremuloides	T1	100	35	15	70	59
Picea glauca	T2	56	11	1	15	25
Picea spp.	T2	11	15	15	15	13
Picea glauca	T3	56	3	1	5	12
Picea spp.	T3	11	5	5	5	7
Populus balsamifera	T3	11	1	1	1	2
Populus tremuloides	T3	67	3	1	10	15
Arctostaphylos rubra	S4	33	1	1	1	5
Arctostaphylos uva-ursi	S4	67	10	2	20	26
Betula glandulosa	S3	22	17	4	30	19
Empetrum nigrum	S4	78	6	2	15	22
Ledum spp.	S3	67	8	1	15	23
Potentilla fruticosa	S3	22	1	1	2	5
Ribes triste	S3	11	25	25	25	17
Rosa acicularis	S3	89	3	1	5	16
Salix bebbiana	S2	33	4	1	10	11
Salix glauca	S2	22	1	1	1	4
Salix myrtillifolia	S4	33	4	1	10	11
Shepherdia canadensis	S3	89	13	1	60	34
Vaccinium uliginosum	S3	56	7	1	15	20
Vaccinium vitis-idaea	S4	89	15	5	20	37
Viburnum edule	S3	33	3	1	7	11
Aconitum delphiniifolium	F	11	1	1	1	2
Aster sibiricus	F	33	3	2	4	10
Astragalus spp.	F	22	1	1	1	3
Cornus canadensis	F	11	10	10	10	11
Epilobium angustifolium	F	100	1	1	2	9
Equisetum spp.	F	33	2	1	2	7
Gentiana spp.	F	22	1	1	1	3
Geocaulon lividum	F	100	6	2	15	24
Hedysarum alpinum	F	11	1	1	1	3
Linnaea borealis	F	56	4	1	7	15
Lupinus arcticus	F	33	1	1	3	7
Lycopodium spp.	F	11	1	1	1	3
Mertensia paniculata	F	11	2	2	2	5
Pyrola spp.	F	44	1	1	1	5
Senecio spp.	F	11	1	1	1	3
Arctagrostis latifolia	G	11	1	1	1	2
Calamagrostis canadensis	G	33	1	1	1	4
Calamagrostis purpurascens	G	22	1	1	1	3
Festuca altaica	G	56	3	1	10	13
Poa spp.	G	11	1	1	1	2
Moss layer	M	100	22	1	40	47
Lichen layer	L	100	12	1	45	35
Bare soil	B	89	3	1	10	15
Litter and mulch	B	100	58	35	80	76
Rock fragments	B	33	1	1	2	6
Woody litter (>1" dia.)	B	100	12	2	20	35

Number of stands = 9
ctsumtab

Sedge wet meadow

***Carex* spp. wet meadow**

CAREX

(Figures 10, 11, and 13; Plate 10—upper photo)

Description

Sedge wet meadow consists of a mosaic of subarctic lowland sedge wet meadows, sedge bog meadows, and sedge-moss bog meadows (*Viereck et al. 1992*). Sedge wet meadow is in depressions and adjacent to ponds and lakes. Zonal patterns are evident in many meadows with bog meadows occupying the wetter, central portions and wet meadows occurring along the higher, less wet outer areas. Upper margins and other drier microsites often support bluejoint meadow (*Viereck et al. 1992*).

Wet meadow areas typically consist of relatively dense stands of tall, coarse sedges and often cottongrass. Common sedges include *Carex aquatilis*, *C. rostrata*, *C. saxatilis*, *and C. membranacea*. *Eriophorum angustifolium* is the most common cottongrass. Low growing, slender sedges and cottongrass growing out of a wet peat substrate typically dominate bog meadows. Common species include *Carex aurea*, *C. leptalea*, *C. dioica*, *Trichophorum alpinum*, and *T. cespitosum*. *Sphagnum* and other mosses are common to abundant in bog meadows. Bluejoint meadows consists of a dense sward of *Calamagrostis canadensis* and occasional herbs.

Except for *Potentilla palustris* and occasionally *Menyanthes trifoliata*, broad-leaved forbs generally are uncommon in Sedge wet meadow. Shrubs are rare to absent in most stands and are generally restricted to mounds and other elevated microsites. Various low willows, primarily *Salix planifolia* and *Betula glandulosa,* are common to well-represented along the edges of Sedge wet meadow where the type is transitional to adjacent forest and scrub communities.

Setting

Distribution and extent: widely distributed throughout the uplands and on stream terraces; minor extent

Elevation: 1,900 to 3,000 feet (579 to 914 m)

Landforms: depressions and nearly level drainages on stream terraces, lacustrine terraces, and till plains; margins and near-shore areas of lakes and ponds

Principal soils: Hufman, Cryofibrists, and Pergelic Cryohemists (The thickness of the surface organic mat usually ranges from 18 to 60 inches [46 to 152 cm] or more.)

Depth to seasonally high water table: almost always less than 6 inches (less than 15 cm) below the surface; most areas have ponding up to 6 inches (15 cm) deep especially early in the growing season

Occurrence of permafrost: none

Successional Status

Sedge wet meadow is probably a stable plant community on most sites. In sloughs and abandoned channels on flood plains, siltation may enable gradual succession toward Low shrub birch-willow/water sedge scrub and similar plant communities.

Riparian-Wetland Status

Classification: Palustrine persistent emergent, permanently flooded to saturated, organic (*Cowardin et al. 1979*); riparian

Sedge wet meadow

Carex spp. wet meadow

CAREX

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T3	17	1	1	2	4
Picea mariana	T3	23	3	1	10	9
Betula glandulosa	SS	47	4	1	15	14
Chamaedaphne calyculata	SS	17	2	1	5	6
Ledum spp.	SS	20	2	1	4	7
Oxycoccus microcarpos	SS	20	1	1	2	4
Salix fuscescens	SS	17	4	1	20	9
Salix spp.	SS	50	7	1	65	18
Vaccinium uliginosum	SS	23	4	1	10	9
Equisetum spp.	F	20	6	1	15	11
Menyanthes trifoliata	F	23	8	1	30	13
Parnassia palustris	F	13	1	1	2	4
Petasites frigidus	F	17	2	1	5	5
Polemonium acutiflorum	F	27	2	1	5	7
Potentilla palustris	F	67	7	1	40	22
Rubus arcticus	F	13	1	1	1	3
Valeriana spp.	F	13	1	1	1	3
Arctagrostis latifolia	G	17	4	1	10	8
Calamagrostis canadensis	G	30	18	1	50	23
Carex aquatilis	G	73	59	15	95	66
Carex spp.	G	53	20	1	95	33
Eriophorum spp.	G	20	18	1	80	19
Moss layer	M	93	37	1	100	59
Lichen layer	L	23	3	1	15	9
Bare soil	B	23	4	1	20	10
Litter and mulch	B	97	20	1	75	44
Surface water	B	90	31	1	95	53
Woody litter (>1" dia.)	B	30	7	1	50	14

Salix spp. includes: SABA3, SAMO2, SAPL2

Number of stands = 30

ctsumtab

Sedge-grass riparian meadow
***Carex aquatilis-Calamagrostis canadensis* riparian meadow**
riparian
(Figures 2, 4, 7, and 9; Plates 2—upper photo, 3—lower photo, and 6—lower photo)

Description

Sedge-grass riparian meadow consists of closed, dense stands of mixed sedge, grass, and other herbs growing primarily along the river banks and low flood plains. Composition varies from stands of *Carex aquatilis,* to mixed stands, to stands predominantly of *Calamagrostis canadensis* and/or *Arctagrostis latifolia*. Other common sedges tentatively identified include *Carex rostrata* and *C. rhynchosphysa*. Low willows (*Salix barclayi*, *S. monticola*, *S. planifolia*) are common to well-represented in many stands, particularly along the edge with adjacent willow scrub cover types. *Potentilla palustris*, *Equisetum* spp., and other forbs are common in most stands.

Setting

Distribution and extent: throughout the survey area; minor extent
Elevation: 1,900 to 2,870 feet (594 to 875 m)
Landforms: level flood plains immediately adjacent to the channel, depressions on flood plains, and the lower edge of steep stream banks; terrace height ranges from 0 to 2 feet (0 to .6 m)
Principal soils: Swedna, very poorly drained, and Aquatna
Depth to seasonally high water table: 0 to 10 inches (0 to 25 cm) (Edges of stands adjacent to the channel may be ponded much of the growing season; elsewhere ponding is common during periods of high run off.)
Flooding frequency: frequent

Successional Status

Sedge-grass riparian meadow is restricted to continuously saturated margins of river channels. Sedge-grass riparian meadow is similar to Low shrub birch-willow/water sedge scrub, which is present in shallow, low gradient drainages on stream terraces and lacustrine terraces. Both types appear to be restricted to sites associated with flowing water.

Riparian-Wetland Status

Classification: Palustrine persistent emergent, semi-permanently flooded, mineral (*Cowardin et al. 1979*); riparian

Sedge-grass riparian meadow

Carex aquatilis-Calamagrostis canadensis **riparian meadow**

riparian

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Alnus tenuifolia	SS	22	2	1	2	6
Potentilla fruticosa	SS	33	2	1	3	7
Salix alaxensis	SS	33	8	5	10	17
Salix spp.	SS	78	7	1	15	23
Aconitum delphiniifolium	F	11	1	1	1	2
Artemisia tilesii	F	44	1	1	2	6
Aster sibiricus	F	44	1	1	1	5
Astragalus spp.	F	11	1	1	1	2
Cardamine pratensis var. angustifolia	F	11	2	2	2	5
Chrysosplenium tetrandrum	F	11	1	1	1	2
Epilobium angustifolium	F	33	2	1	4	7
Epilobium palustre	F	33	1	1	1	4
Equisetum fluviatile	F	33	5	1	10	12
Equisetum palustre	F	22	40	30	50	30
Equisetum spp.	F	22	3	1	5	8
Erigeron acris	F	11	1	1	1	2
Galium boreale	F	11	1	1	1	3
Galium trifidum	F	22	1	1	1	3
Geum macrophyllum	F	22	8	1	15	13
Hedysarum alpinum	F	11	1	1	1	2
Mertensia paniculata	F	11	1	1	1	2
Parnassia palustris	F	56	1	1	2	7
Platanthera hyperborea	F	11	1	1	1	2
Polemonium acutiflorum	F	22	2	1	3	6
Potentilla palustris	F	56	5	1	10	16
Rorippa hispida	F	22	2	1	3	6
Rubus arcticus	F	22	1	1	1	3
Rumex arcticus	F	11	1	1	1	2
Sanguisorba stipulata	F	11	1	1	1	2
Valeriana spp.	F	22	1	1	1	4
Agropyron spp.	G	11	15	15	15	13
Agropyron trachycaulum	G	11	10	10	10	11
Agrostis scabra	G	11	2	2	2	5
Arctagrostis latifolia	G	44	24	10	55	32
Calamagrostis canadensis	G	56	27	1	70	39
Carex aquatilis	G	67	47	10	80	56
Carex spp.	G	78	16	1	50	35
Eriophorum spp.	G	11	1	1	1	2
Hierochloe odorata	G	33	5	1	15	13
Juncus spp.	G	11	1	1	1	2
Poa spp.	G	44	4	1	10	13
Moss layer	M	78	18	1	35	38
Lichen layer	L	22	1	1	2	5
Bare soil	B	78	30	2	90	48
Litter and mulch	B	100	18	1	50	42
Surface water	B	89	12	1	30	32
Woody litter (>1" dia.)	B	11	1	1	1	2

Salix spp. includes: SABA3, SAMO2, SAPL2
Number of stands = 9
ctsumtab

Sparsely vegetated alluvium

(Plates 3—upper photo and 5—lower photo)

Description

Sparsely vegetated alluvium consists of sparse stands of pioneering species on areas of recently deposited or exposed alluvium. Vegetative cover in these stands is generally low, ranging from less than 20 percent to 45 percent, or occasionally more. A wide variety of plant species in various combinations are in these stands. Common species on areas of Sparsely vegetated alluvium are listed in the Species Summary List.

Setting

Distribution and extent: throughout the survey area; minor extent
Elevation: 1,900 to 2,875 feet (579 to 876 m)
Landforms: low flood plains immediately adjacent to the channel; terrace height is usually less than 2 feet (less than 0.6 m)
Flooding frequency: frequent

Successional Status

Sparsely vegetated alluvium is a pioneering stage of flood plain succession in both the willow and alder zones. All species in the Sparsely vegetated alluvium type appear to share several key adaptive traits—the ability to rapidly invade disturbed sites and exposed alluvium, and the ability to tolerate annual flooding and repeated siltation. Many of these pioneering species are dominants in later stages of vegetative progression. Examples include *Salix alaxensis*, *Alnus tenuifolia*, *Populus balsamifera*, and *Picea glauca*. Others are apparently intolerant of competition and soon become rare or absent as vegetation development progresses. Examples include *Epilobium latifolium*, *Achillea millefolium*, *Fragaria virginiana*, and *Erigeron* spp.

Wetland Status

Classification: Palustrine vegetated unconsolidated shore, Palustrine persistent emergent, Palustrine broad-leaved deciduous scrub-shrub (*Cowardin et al. 1979*); water regime ranges from temporarily to intermittently flooded; soils are mineral; usually riparian

Sparsely vegetated alluvium

Species Summary List

```
Tree seedlings/shrubs
---------------------
Alnus tenuifolia
Picea glauca
Populus balsamifera
Rosa acicularis
Salix alaxensis
Salix barclayi
Salix planifolia

Grasses
---------------------
Agropyron trachycaulum
Agrostis scabra
Calamagrostis inexpansa
Hierochloe alpina
Poa spp.
Trisetum spicatum

Forbs
-----------------------
Achillea millefolium
Artemisia tilesii
Astragalus spp.
Astragalus sibiricus
Castilleja spp.
Erigeron spp.
Epilobium angustifolium
Epilobium latifolium
Fragaria virginiana
Galium boreale
Hedysarum alpinum
Taraxacum officinale
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Sparsely vegetated escarpments

Description

Sparsely vegetated escarpments consists of sparse, discontinuous stands of small trees and tree regeneration, shrubs, and herbs on steep and very steep escarpments. Mass wasting and accelerated erosion is evident in most stands. The vegetation cover includes recently established plants as well as clumps of vegetation on soil materials that have broken off and moved down from higher up on the slope. In places where the slope has stabilized, fairly dense vegetation cover often develops.

Frequently occurring woody species include *Populus balsamifera* and *P. tremuloides*, *Shepherdia canadensis*, *Alnus crispa*, *Betula glandulosa*, *Ledum* spp., and various *Salix* spp. Frequent herbs include *Achillea millefolium*, *Agropyron trachycaulum*, *Agrostis scabra*, *Aster sibiricus*, *Calamagrostis canadensis*, *Epilobium angustifolium* and *E. latifolium*, *Equisetum* spp., *Hedysarum alpinum*, and other pioneering species occurring on flood plains and uplands.

Setting

Distribution and extent: widespread, particularly along the mid and lower Main Stem and mid West Fork; minor extent
Elevation: 1,900 to 2,700 feet (579 to 823 m)
Landforms: steep and very steep, unstable escarpments
Principal soils: Cryorthents and Cryorthods

Successional Status

Sparsely vegetated escarpments is early seral, pioneering cover restricted to areas of mass wasting and erosion on escarpments. Continued vegetation succession appears dependent on a lessening of the slope gradient and increased stability to allow the development of continuous vegetative cover.

Riparian-Wetland Status

Classification: upland

Sparsely vegetated outwash

(Plate 12—upper photo)

Description

Sparsely vegetated outwash consists of patches of mosses and lichen and scattered dwarf shrub and herbs on gravelly and cobbly outwash deposits. Moss and lichen cover is generally less than 50 percent and vascular plant cover is less than 20 percent. Frequently occurring species identified on areas of Sparsely vegetated outwash include *Arctostaphylos alpina*, *Artemisia arctica*, *Betula glandulosa*, *Empetrum nigrum*, *Festuca altaica*, *Hierochloe alpina*, *Ledum decumbens*, *Pedicularis labradorica*, and *Vaccinium vitis-idaea*.

Setting

Distribution and extent: uplands in the vicinity of Dickey Lake; minor extent
Elevation: 2,800 to 3,000 feet (854 to 915 m)
Landforms: pitted glacial outwash plains and hills; usually convex positions on slope shoulders and crests
Principal soils: Pippod, high elevation

Successional Status

Although Sparsely vegetated outwash is best described as pioneering vegetation on fresh outwash deposits, this type is likely the potential under existing site conditions and soil development.

Riparian-Wetland Status

Classification: upland

Spruce/alder woodland
Picea spp. / *Alnus* spp. woodland
PICEA/ALNUS

Description

Spruce/alder woodland consists of woodland, open, and occasionally moderately open, stands of *Picea glauca*, *P. mariana*, and mixed *P. glauca* and *P. mariana*. Tree canopy cover ranges from 20 to 45 percent. Tree size within most stands is variable, ranging from medium to tall, 20 to 55 feet (6.1 to 16.8 m) in height.

The understory is characterized by a sparse to moderately closed tall shrub layer dominated by *Alnus crispa* (occasionally *A. tenuifolia*). *Salix glauca* is a common to well-represented tall shrub in many stands. Tall shrubs range from 10 to 65 percent canopy cover and 7 to 15 feet (2.1 to 4.6 m) in height. Medium and low shrubs form an open to occasionally closed secondary shrub layer 3 to 6 feet (0.9 to 1.8 m) in height. Important medium and low shrubs include *Betula glandulosa*, *Salix planifolia*, *Ledum* spp., and *Vaccinium uliginosum*. Dwarf shrubs, primarily *V. vitis-idaea* and *Empetrum nigrum*, are common in many stands.

Except for *Equisetum* spp., which is abundant in many stands, herbs are generally only a minor component in Spruce/alder woodland. Patches of moss and leaf litter cover the ground surface.

Setting

Distribution and extent: widely distributed in scattered locations on uplands and escarpments; minor extent

Elevation: 1,950 to 2,600 feet (594 to 792 m)

Landforms: moderately steep to very steep hill slopes and escarpments, occasionally on strongly sloping lacustrine terraces; usually in drainages and areas of ground water seepage

Principal soils: Cryorthents, Cryaquepts, Klasi, and Mendna (The thickness of the surface organic mat is typically 5 to 16 inches [12.7 to 41 cm].)

Depth to permafrost: usually greater than 60 inches (greater than 152 cm), occasionally as shallow as 24 inches (61 cm)

Depth to seasonally high water table: variable; ranges from within the organic mat to more than 60 inches (more than 152 cm) below mineral surface

Successional Status

Spruce/alder woodland appears to be restricted to cool and moist sites such as north aspects and ephemeral drainages and seepage areas on escarpments and steep slopes. This cover type is probably stable on these sites.

Riparian-Wetland Status

Classification: upland and Palustrine needle-leafed evergreen forested, intermittently flooded, mineral (*Cowardin et al. 1979*); occasionally riparian

Spruce/alder woodland
Picea spp. / *Alnus* spp. woodland
PICEA/ALNUS

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T1	33	18	5	30	24
Picea mariana	T1	17	2	2	2	6
Picea spp.	T1	17	20	20	20	18
Populus balsamifera	T1	17	3	3	3	7
Picea glauca	T2	33	13	5	20	20
Picea mariana	T2	33	35	25	45	34
Betula papyrifera	T3	17	1	1	1	3
Picea mariana	T3	33	3	1	5	10
Populus balsamifera	T3	17	2	2	2	6
Alnus crispa	S2	67	25	10	50	41
Alnus tenuifolia	S2	33	18	10	25	24
Arctostaphylos rubra	S4	67	2	1	3	12
Betula glandulosa	SM	83	14	5	30	35
Empetrum nigrum	S4	67	9	2	20	25
Ledum spp.	S3	100	18	10	30	43
Rosa acicularis	S3	67	2	1	3	11
Salix glauca	SM	50	11	2	15	23
Salix spp.	S3	50	15	4	30	27
Shepherdia canadensis	S3	17	1	1	1	4
Spiraea beauverdiana	S3	17	4	4	4	8
Vaccinium uliginosum	S3	100	13	7	20	37
Vaccinium vitis-idaea	S4	100	8	4	15	28
Epilobium angustifolium	F	17	1	1	1	3
Equisetum scirpoides	F	17	1	1	1	3
Equisetum spp.	F	67	25	1	55	40
Gentiana spp.	F	17	1	1	1	3
Geocaulon lividum	F	33	1	1	1	5
Pedicularis labradorica	F	17	1	1	1	3
Petasites frigidus	F	67	4	1	10	17
Polygonum bistorta	F	17	1	1	1	3
Pyrola spp.	F	17	1	1	1	3
Rubus arcticus	F	17	1	1	1	3
Rubus chamaemorus	F	33	3	1	5	10
Senecio spp.	F	17	1	1	1	4
Tofieldia coccinea	F	17	1	1	1	3
Arctagrostis latifolia	G	67	1	1	2	8
Calamagrostis purpurascens	G	17	5	5	5	9
Carex lugens	G	17	4	4	4	8
Carex spp.	G	33	1	1	1	4
Moss layer	M	100	53	35	85	72
Lichen layer	L	100	11	1	20	32
Bare soil	B	50	1	1	1	6
Litter and mulch	B	100	14	1	50	38
Rock fragments	B	50	2	1	3	9
Surface water	B	33	2	1	2	7
Woody litter (>1" dia.)	B	50	2	1	5	10

Salix spp. includes: SAMO2, SAPL2
Number of stands = 6
ctsumtab

Spruce/lichen woodland

***Picea* spp. / lichen woodland**

PICEA/lichen

(Figure 8; Plate 1—upper photo)

Description

Spruce/lichen woodland consists of woodland to moderately open stands of *Picea glauca* and *P. mariana*. Where both species occur, the tallest trees are typically *P. glauca,* while *P. mariana* is mixed with the *P. glauca* in lower tree layers. In some stands, *P. mariana* is dominant in all tree layers. Tree canopy cover ranges from 15 to 60 percent. In most stands, tree size varies from regeneration to medium height. The tallest trees in a stand are generally 15 to 45 feet (4.5 to 13.8 m) in height and 4 to 6.5 inches (10 to 16.5 cm) in diameter at ground level. Tree basal area in 5 sample stands ranged from 44 to 85 feet^2/acre (10.1 to 19.5 m^2/ha).

Although medium, low, and dwarf shrubs form a nearly continuous, open to closed shrub layer, the overall aspect of the understory is dominated by a patchy to nearly continuous cover of mixed fruticose lichens and mosses on the ground surface. Common lichen generally include *Cladina*, *Cladonia*, and *Stereocaulon*. Common mosses include *Tomentypnum*, *Ptilium*, and *Polytrichum*. Lichen cover ranges from 30 to 65 percent and moss cover from 5 to 40 percent.

Shrub cover ranges from 35 to 65 percent and from 1 to 8 feet (0.3 to 2.4 m) in height. Important medium and low shrubs are *Betula glandulosa*, *Ledum* spp., *Vaccinium uliginosum*, *V. vitis-idaea*, *Salix planifolia*, and *Empetrum nigrum*. Herbs are sparse to common in most stands of Spruce/lichen woodland.

Setting

Distribution and extent: river corridor and uplands throughout the survey area; moderately extensive

Elevation: 1,900 to 2,800 feet (579 to 853 m)

Landforms: nearly level to occasionally steep stream terraces, lacustrine terraces, outwash plains, alluvial fans, and hill slopes

Principal soils: Chistna, Chelina, Maclaren, and Clarena (This type occurs mostly on coarse textured, well drained to excessively well drained soils with an organic mat of less than 4 inches [less than 10 cm].)

Depth to permafrost: almost always greater than 60 inches (greater than 152 cm)

Depth to seasonally high water table: almost always greater than 60 inches (greater than 152 cm)

Successional Status

Spruce/lichen woodland is best described as mid to late seral. This type develops from Low shrub birch/lichen scrub on coarse textured soils following severe wildfires. Spruce/lichen woodland is probably potential vegetation on sites with a short fire return interval. Elsewhere, and on finer textured soils, continued succession may lead to Spruce/shrub birch woodland or Spruce/spruce muskeg sedge open forest.

Spruce/lichen woodland is similar in structure and composition to Spruce/shrub birch woodland. Lichen cover is lower and moss cover higher in Spruce/shrub birch woodland.

Riparian-Wetland Status

Classification: upland

Spruce/lichen woodland
Picea **spp. / lichen woodland**
PICEA/lichen

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T1	26	17	1	35	21
Picea glauca	T2	26	16	2	20	20
Picea mariana	T2	36	22	3	40	28
Picea glauca	T3	18	7	2	20	11
Picea mariana	T3	34	5	1	15	13
Arctostaphylos rubra	S4	24	2	1	5	7
Betula glandulosa	SM	98	30	1	75	54
Empetrum nigrum	S4	74	6	1	25	20
Ledum spp.	S3	98	24	3	50	49
Rosa acicularis	S3	56	1	1	5	9
Salix glauca	SM	52	7	1	20	19
Salix myrtillifolia	S4	42	3	1	10	11
Salix planifolia	SM	70	5	1	25	19
Shepherdia canadensis	S3	12	2	1	6	5
Vaccinium uliginosum	S3	98	18	2	45	42
Vaccinium vitis-idaea	S4	98	9	2	20	30
Cornus canadensis	F	22	1	1	2	4
Epilobium angustifolium	F	38	1	1	3	5
Equisetum spp.	F	26	4	1	15	10
Geocaulon lividum	F	24	3	1	10	9
Lycopodium spp.	F	18	2	1	6	6
Pedicularis labradorica	F	14	1	1	1	3
Petasites frigidus	F	32	2	1	4	7
Arctagrostis latifolia	G	34	2	1	8	9
Calamagrostis canadensis	G	12	1	1	2	3
Carex lugens	G	30	3	1	15	9
Carex spp.	G	12	1	1	1	3
Festuca altaica	G	34	4	1	15	11
Moss layer	M	100	25	5	40	50
Lichen layer	L	100	49	30	65	70
Bare soil	B	72	4	1	35	17
Litter and mulch	B	100	17	1	35	41
Woody litter (>1" dia.)	B	86	4	1	25	19

Number of stands = 50
ctsumtab

Spruce/shrub birch woodland

***Picea* spp. / *Betula glandulosa* woodland**

PICEA/BEGL

(Figures 4, 5, 7, 8, 10, 12, 13, and 15; Plates 2—lower photo, 4—upper photo, 7—upper photo, and 11—upper photo)

Description

Spruce/shrub birch woodland consists of woodland to occasionally moderately open stands of spruce. Overstory composition varies from *Picea glauca* to mixed *P. glauca* and *P. mariana*. Tree canopy cover ranges from 10 to 55 percent. Trees are typically 15 to 35 feet (4.6 to 10.7 m) in height and 4 to 6.5 inches (10 to 16.5 cm) in diameter at ground level. Trees and small stands to 60 feet (18.3 m) in height occasionally occur. Basal area of trees varies considerably between stands, ranging from 23 to 130 feet^2/acre (5.3 to 29.8 m^2/ha) in 18 sample stands. Snags and charred boles and downfall are well-represented in burned stands.

The understory is dominated by abundant to very abundant medium, low, and dwarf shrubs. There are usually two relatively distinct shrub layers. The upper layer is approximately 4.5 to 6 feet (1.4 to 1.8 m) in height. The overall dominant medium shrub is *Betula glandulosa*; however, *Salix planifolia* is common in most stands. *S. glauca* and other tall willows are common to well-represented in many stands. The lower shrub layer is composed of a number of low and dwarf ericaceous shrub 0.5 to 3.5 feet (0.2 to 1.1 m) in height. Common to abundant species include *Ledum* spp., *Vaccinium uliginosum*, *V. vitis-idaea*, *Empetrum nigrum*, and *Arctostaphylos rubra*. Total shrub canopy cover ranges from around 45 to 90 percent or more.

Herbs generally are of minor importance in Spruce/shrub birch woodland. Commonly occurring species include *Petasites frigidus*, *Arctagrostis latifolia*, *Equisetum* spp., *Rubus chamaemorus*, and *Carex lugens*. Mosses and lichens on the ground surface range from sparse, scattered patches to nearly continuous, luxuriant cover, depending on fire history and stand age.

Setting

Distribution and extent: river corridor and uplands; one of the most extensive and widely distributed cover types in the survey area

Elevation: 1,850 to 3,000 feet (564 to 914 m)

Landforms: nearly level stream terraces; nearly level to strongly sloping lacustrine terraces; and moderately steep to steep hill slopes, escarpments, and alluvial fans

Principal soils: all mineral soils on stream terraces and uplands in the survey area; organic mat thickness ranges from 0 to 10 inches (0 to 25 cm)

Depth to permafrost: primarily greater than 40 inches (greater than 102 cm); occasionally from 0 to 40 inches (0 to 102 cm)

Depth to seasonally high water table: primarily greater than 40 inches (greater than 102 cm) below the mineral surface; frequently from within the organic mat to 40 inches (102 cm)

Successional Status

Spruce/shrub birch woodland is best described as mid to late seral. This type develops on a wide variety of sites following fire, either from Low shrub birch scrub or Low shrub birch/lichen scrub. On sandy and gravelly soils on stream terraces, outwash plains, and strandline deposits, and other sites with a short fire return interval, Spruce/shrub birch woodland is probably the potential. Elsewhere, continued succession may lead to

Spruce/spruce muskeg sedge open forest and possibly Black spruce/closed sheath cottongrass woodland.

Riparian-Wetland Status

Classification: almost always upland; occasionally Palustrine needle-leafed evergreen scrub-shrub and forested (*Cowardin et al. 1979*)

Spruce/shrub birch woodland

***Picea* spp. / *Betula glandulosa* woodland**

PICEA/BEGL

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T1	12	22	5	50	16
Picea glauca	T2	43	17	10	45	27
Picea mariana	T2	26	22	7	45	24
Picea spp.	T2	15	23	10	40	19
Picea glauca	T3	23	5	1	15	11
Picea mariana	T3	23	8	1	30	14
Arctostaphylos rubra	S4	39	5	1	25	14
Betula glandulosa	SM	88	26	1	70	47
Empetrum nigrum	S4	84	6	1	35	21
Ledum spp.	S3	99	23	1	60	48
Potentilla fruticosa	S3	24	3	1	12	8
Rosa acicularis	S3	44	2	1	15	10
Salix glauca	SM	43	10	1	65	20
Salix myrtillifolia	S4	33	4	1	15	12
Salix spp.	SM	79	8	1	40	25
Vaccinium uliginosum	S3	97	19	4	45	42
Vaccinium vitis-idaea	S4	97	8	1	40	28
Cornus canadensis	F	24	2	1	10	7
Epilobium angustifolium	F	38	1	1	7	6
Equisetum spp.	F	55	11	1	70	25
Pedicularis labradorica	F	16	1	1	2	3
Petasites frigidus	F	73	3	1	15	16
Rubus chamaemorus	F	32	2	1	15	9
Senecio spp.	F	16	1	1	5	4
Arctagrostis latifolia	G	73	3	1	35	15
Calamagrostis canadensis	G	18	2	1	12	7
Carex lugens	G	30	4	1	15	11
Carex spp.	G	34	4	1	20	11
Eriophorum brachyantherum	G	13	4	1	10	7
Eriophorum spp.	G	13	2	1	5	4
Moss layer	M	100	52	5	95	72
Lichen layer	L	99	16	1	60	40
Bare soil	B	39	2	1	15	9
Litter and mulch	B	98	13	1	50	36
Surface water	B	23	1	1	7	6
Woody litter (>1" dia.)	B	68	4	1	20	16

Salix spp. includes: SABA3, SAMO2, SAPL2

Number of stands = 168

ctsumtab

Spruce/spruce muskeg sedge open forest

***Picea* spp. / *Carex lugens* open forest**

PICEA/CALU2

(Figures 10 and 11; Plate 8—upper photo)

Description

Spruce/spruce muskeg sedge open forest consists of open to moderately open stands of spruce, with occasional woodland and moderately closed stands. Overstory composition varies from *Picea mariana* to mixed *P. mariana* and *P. glauca*. Tree canopy cover ranges from 10 to 55 percent. Trees are typically 15 to 35 feet (4.6 to 10.7 m) in height and 4.0 to 6.5 inches (10.0 to 16.5 cm) in diameter at ground level. Trees and small stands to 60 feet (18 m) in height occasionally occur. Basal area of trees varies considerably between stands, ranging from 30 to 125 feet^2/acre (6.9 to 28.7 m^2/ha) in 13 sample stands.

Compared to Spruce/shrub birch woodland and Spruce/lichen woodland, herbs are abundant to very abundant in the ground layer of Spruce/spruce muskeg sedge open forest. *Carex lugens* typically ranges from 15 to occasionally over 70 percent canopy cover. Other important herbs include *Petasites frigidus*, *Equisetum* spp., *Rubus chamaemorus*, *Eriophorum brachyantherum*, and *Arctagrostis latifolia*. Mosses and lichens are well-represented to more commonly abundant on the soil surface.

Like other spruce cover types, medium, low, and dwarf shrubs are also important in Spruce/spruce muskeg sedge open forest. Total shrub canopy cover ranges from around 30 to 70 percent or more. *Betula glandulosa* approximately 4.5 to 6 feet (0.4 to 1.8 m) in height and *Ledum* spp. and *Vaccinium uliginosum* 2 to 3.5 feet (0.6 to 1.1 m) in height are the most important shrubs. In most stands, *Salix planifolia* also is a common medium shrub. *S. glauca* and other tall willows are common to well-represented in many stands. Common low shrubs include *V. vitis-idaea*, *Empetrum nigrum*, *Arctostaphylos rubra*, and *S. myrtillifolia*.

Setting

Distribution and extent: river corridor and uplands throughout the survey area; extensive
Elevation: 1,850 to 3,000 feet (564 to 914 m)
Landforms: mostly nearly level to strongly sloping lacustrine terraces and stream terraces; also moderately steep hill slopes
Principal soils: Klasi, Mendna, Cryaquepts, Kuslinad, and Chelina (Organic mat thickness mostly ranges from 2 to 15 inches [5 to 38 cm].)
Depth to permafrost: variable; ranges from the mineral surface to greater than 60 inches (greater than 152 cm)
Depth to seasonally high water table: variable; generally either less than 6 inches (less than 15 cm) or greater than 60 inches (greater than 152 cm)

Successional Status

Spruce/spruce muskeg sedge open forest represents late seral to potential vegetation on sites where it occurs. Sites that have remained undisturbed by wildfire for a long period generally have shallow permafrost and a perched water table. This type develops from Low shrub birch scrub and Spruce/shrub birch woodland.

Riparian-Wetland Status

Classification: varies from upland to Palustrine needle-leafed evergreen scrub-shrub and forested (*Cowardin et al. 1979*)

Spruce/spruce muskeg sedge open forest

Picea spp. / *Carex lugens* open forest

PICEA/CALU2

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea mariana	T2	43	21	10	50	30
Picea spp.	T2	22	22	10	45	22
Picea mariana	TX	20	30	20	40	25
Picea mariana	T3	40	8	1	25	18
Picea spp.	T3	13	5	1	10	8
Arctostaphylos rubra	S4	76	5	1	20	20
Betula glandulosa	SM	90	16	1	60	38
Empetrum nigrum	S4	87	5	1	20	21
Ledum spp.	S3	100	22	3	55	47
Oxycoccus microcarpos	S4	25	1	1	1	4
Potentilla fruticosa	S3	25	2	1	7	7
Rosa acicularis	S3	14	1	1	6	5
Salix bebbiana	S2	13	4	1	8	7
Salix glauca	S2	47	9	1	25	20
Salix myrtillifolia	S4	57	6	1	15	18
Salix reticulata	S4	25	3	1	10	8
Salix spp.	SM	83	7	1	35	25
Vaccinium uliginosum	S3	100	15	5	35	39
Vaccinium vitis-idaea	S4	96	6	1	20	25
Equisetum scirpoides	F	17	1	1	1	3
Equisetum spp.	F	37	4	1	20	12
Pedicularis labradorica	F	29	1	1	2	4
Petasites frigidus	F	96	4	1	25	19
Rubus chamaemorus	F	48	4	1	30	15
Senecio spp.	F	18	1	1	1	3
Arctagrostis latifolia	G	73	3	1	10	15
Calamagrostis canadensis	G	11	1	1	3	4
Carex lugens	G	100	40	7	80	63
Eriophorum brachyantherum	G	45	5	1	15	16
Moss layer	M	100	58	5	90	76
Lichen layer	L	100	20	2	55	45
Bare soil	B	35	2	1	15	7
Litter and mulch	B	100	18	1	50	42
Surface water	B	49	3	1	15	11
Woody litter (>1" dia.)	B	93	3	1	15	17

Salix spp. includes: SABA3, SAMO2, SAPL2, SARI4

Number of stands = 83

ctsumtab

Spruce/water sedge woodland
***Picea* spp. / *Carex aquatilis* woodland**
PICEA/CAAQ

Description

Spruce/water sedge woodland consists of woodland to occasionally open stands of *Picea mariana* and *P. glauca* 9 to 20 feet (2.7 to 6.1 m) in height. Tree canopy ranges from around 10 to 30 percent. Tree basal area is generally low. In a representative stand, total basal area was 17 feet^2/acre (3.9 m^2/ha).

The woodland understory consists of an open to occasionally moderately closed layer of low shrubs 2 to 5 feet (0.6 to 1.5 m) in height. Important low shrubs include *Salix planifolia*, *Betula glandulosa*, *Ledum* spp., and *Vaccinium uliginosum*. Shrub canopy cover ranges from 20 to 70 percent. Slightly below to intermixed with the shrub layer is an open to moderately closed layer of *Carex aquatilis* and other medium, bright green *Carex* spp. Other important herbs in many stands include *Eriophorum angustifolium* and *E. brachyantherum*, *Equisetum* spp. *Petasites frigidus*, and *Potentilla palustris*. Other herbs are generally of relatively minor importance. Mosses are abundant in most stands, and slowly flowing and standing water covers a large portion of the ground surface, particularly early in the growing season.

Setting

Distribution and extent: widely distributed throughout the uplands and river corridor; minor extent
Elevation: 1,900 to 3,000 feet (579 to 915 m)
Landforms: nearly level to moderately sloping, weakly developed drainage networks and margins of depressions on broadly concave lacustrine terraces; frequently in depressions and old channels on stream terraces
Principal soils: Ewan, Klasi, and Kuslinad
Depth to permafrost: variable; ranges from occasionally less than 20 to greater than 60 inches (less than 51 to greater than 152 cm)
Depth to seasonally high water table: ponded in spring and early summer; generally between 0 and 30 inches (0 to 76 cm) the remainder of the summer and fall; perched on permafrost

Successional Status

The successional status of Spruce/water sedge woodland is uncertain. This type occurs on margins and elevated microsites in areas with slow moving or aerated water (areas usually occupied by Low shrub birch-willow/water sedge scrub) and is likely late seral or potential vegetation. Compared with the Low shrub birch-willow/water sedge scrub, Spruce/water sedge woodland occurs on soils with generally thinner organic mats.

Riparian-Wetland Status

Classification: Palustrine broad-leaved deciduous and needle-leafed evergreen scrub-shrub, seasonally flooded, mineral (*Cowardin et al. 1979*)

Spruce/water sedge woodland
Picea spp. / *Carex aquatilis* woodland
PICEA/CAAQ

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea mariana	T1	13	10	10	10	11
Picea mariana	T2	25	18	10	25	21
Picea spp.	T2	25	25	20	30	25
Picea glauca	TX	13	10	10	10	11
Picea mariana	TX	25	20	15	25	22
Picea mariana	T3	38	6	3	10	15
Andromeda polifolia	S4	25	1	1	1	4
Arctostaphylos rubra	S4	50	4	2	5	13
Betula glandulosa	S3	100	17	3	40	41
Chamaedaphne calyculata	S4	38	1	1	1	6
Empetrum nigrum	S4	75	2	1	3	13
Ledum spp.	S3	88	11	1	25	31
Oxycoccus microcarpos	S4	50	1	1	1	5
Potentilla fruticosa	S3	50	4	1	10	13
Salix arbusculoides	SM	13	1	1	1	3
Salix myrtillifolia	S4	38	4	3	7	13
Salix planifolia	S3	88	15	1	40	37
Salix reticulata	S4	25	2	2	2	7
Vaccinium uliginosum	S3	100	7	2	15	26
Vaccinium vitis-idaea	S4	75	3	2	5	15
Anemone spp.	F	13	1	1	1	3
Caltha spp.	F	13	1	1	1	3
Chrysosplenium tetrandrum	F	13	1	1	1	3
Epilobium palustre	F	13	3	3	3	6
Equisetum scirpoides	F	13	1	1	1	3
Equisetum spp.	F	63	10	1	41	24
Parnassia palustris	F	13	1	1	1	3
Petasites frigidus	F	88	2	1	5	14
Polygonum spp.	F	13	1	1	1	3
Potentilla palustris	F	25	6	2	10	12
Rubus arcticus	F	13	5	5	5	8
Rubus chamaemorus	F	75	2	1	3	13
Rumex arcticus	F	25	1	1	2	6
Stellaria spp.	F	13	2	2	2	5
Arctagrostis latifolia	G	63	3	1	10	15
Calamagrostis canadensis	G	13	3	3	3	6
Carex aquatilis	G	100	44	15	60	67
Carex saxatilis	G	13	3	3	3	6
Carex spp.	G	50	8	1	25	20
Eriophorum angustifolium	G	25	13	5	20	18
Eriophorum brachyantherum	G	38	7	5	10	17
Moss layer	M	100	39	5	55	63
Lichen layer	L	75	15	1	45	33
Bare soil	B	50	6	1	20	17
Litter and mulch	B	100	13	1	35	36
Surface water	B	75	25	1	50	44
Woody litter (>1" dia.)	B	63	1	1	4	9

Number of stands = 8

ctsumtab

Spruce/willow woodland
***Picea* spp. / *Salix* spp. woodland**
PICEA/SAPL2

Description

Spruce/willow woodland consists of woodland to occasionally moderately open stands of spruce. *Picea glauca* is the dominant tree in most stands, although mixed stands of *P. glauca* and *P. mariana* are also common. Tree canopy cover ranges from 15 to 45 percent. Trees are typically 15 to 35 feet (4.6 to 10.7 m) in height; trees and small stands to 55 feet (16.8 m) in height occasionally occur. Trees in mature stands are typically 4.0 to 7.5 inches (10.0 to 19.1 cm) in diameter at ground level.

The understory is dominated by a medium to low layer of *Salix planifolia*, *S. barclayi*, and often *S. monticola* 3 to 6 feet (0.9 to 1.8 m) in height. *Betula glandulosa*, *Ledum* spp., *Vaccinium uliginosum*, *V. vitis-idaea*, *Empetrum nigrum*, and *S. reticulata* also are important low and dwarf shrubs in many stands. Total shrub canopy cover ranges from around 45 to 90 percent or more.

In general, herbs are of minor importance in Spruce/willow woodland. Commonly occurring species include *Petasites frigidus*, *Equisetum* spp., *Arctagrostis latifolia*, and *Carex lugens*. Mosses are usually abundant on the ground surface, and ponded water is occasional in low microsites.

Setting

Distribution and extent: primarily the lower Middle Fork and upper Main Stem, occasional elsewhere; minor extent
Elevation: 1,850 to 2,800 feet (564 to 853 m)
Landforms: nearly level to strongly sloping hill slopes and lacustrine terraces; occasionally on stream terraces
Principal soils: various (Organic mat thickness ranges from 0 to 10 inches [0 to 25 cm].)
Depth to permafrost: primarily greater than 60 inches (greater than 152 cm); occasionally from 10 to 40 inches (25 to 102 cm)
Depth to seasonally high water table: variable; ranges from 0 to 60 inches (0 to 152 cm) or more

Successional Status

The successional status of Spruce/willow woodland is uncertain. It appears to be a later seral on toeslopes, depressions, and other moist sites that have been undisturbed by wildfire for an extended period of time.

Spruce/willow woodland is similar to White spruce/willow open forest. Spruce/willow woodland generally does not occur on high flood plains and stream terraces. Spruce/willow woodland also is less productive. *P. glauca* in Spruce/willow woodland are usually less than 35 feet (less than 10.7 m) in height, while in mature stands of White spruce/willow open forest *P. glauca* are frequently 55 feet or greater (16.8 m or greater) in height.

Riparian-Wetland Status

Classification: most stands are probably Palustrine needle-leafed evergreen forested and scrub-shrub (*Cowardin et al. 1979*)

Spruce/willow woodland
Picea spp. / *Salix* spp. woodland
PICEA/SAPL2

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T1	30	24	7	30	27
Picea glauca	T2	50	18	10	35	30
Picea glauca	T3	30	4	1	10	11
Arctostaphylos rubra	S4	30	2	1	7	8
Betula glandulosa	SM	85	12	1	25	31
Empetrum nigrum	S4	80	3	1	10	15
Ledum spp.	S3	95	6	1	10	23
Oxycoccus microcarpos	S4	20	1	1	1	3
Potentilla fruticosa	S3	50	3	1	7	12
Salix reticulata	S4	35	11	3	35	20
Salix spp.	SM	100	46	25	80	68
Shepherdia canadensis	S3	20	10	3	25	14
Vaccinium uliginosum	S3	100	9	1	25	30
Vaccinium vitis-idaea	S4	90	2	1	5	14
Cornus canadensis	F	30	1	1	2	5
Epilobium angustifolium	F	50	1	1	1	5
Equisetum spp.	F	85	21	1	92	42
Hedysarum alpinum	F	15	13	2	30	14
Parnassia palustris	F	25	1	1	2	4
Petasites frigidus	F	70	4	1	20	16
Polemonium acutiflorum	F	25	1	1	1	4
Rubus arcticus	F	30	1	1	5	7
Rubus chamaemorus	F	15	2	1	5	5
Senecio spp.	F	20	2	1	5	6
Swertia perennis	F	15	1	1	1	3
Arctagrostis latifolia	G	70	5	1	25	19
Calamagrostis canadensis	G	35	9	1	30	18
Carex spp.	G	65	2	1	5	12
Moss layer	M	100	48	10	90	69
Lichen layer	L	80	4	1	15	18
Bare soil	B	60	1	1	5	9
Litter and mulch	B	100	4	1	20	20
Surface water	B	45	1	1	3	8
Woody litter (>1" dia.)	B	30	4	1	10	12

Salix spp. includes: SABA3, SAMO2, SAPL2
Number of stands = 20
ctsumtab

Tall feltleaf willow scrub

***Salix alaxensis* scrub**

SAAL

(Figure 5; Plates 3—upper photo and 5—lower photo)

Description

Tall feltleaf willow scrub consists of open to moderately closed willow 7 to 15 feet (2.1 to 4.6 m) in height. Lower layers include a sparse to moderately closed low willow layer and an open to moderately closed herb layer.

The tall willow is composed entirely of *Salix alaxensis*—canopy cover ranges from 25 to 70 percent. The low shrub layer ranges from 10 to 70 percent canopy cover and is composed primarily of *S. barclayi* and *S. planifolia*. *Potentilla fruticosa* and *Vaccinium uliginosum* are present in most stands, but other shrubs are generally of minor importance. The composition and abundance of the herb layer is variable, depending on stand location relative to the river channel and the frequency and duration of flooding. Herb cover ranges from 30 to 60 percent in most stands. Important herbs include *Calamagrostis canadensis*, *Equisetum* spp., *Epilobium angustifolium*, *Hedysarum alpinum*, *Parnassia palustris*, and *Rubus arcticus*. Leaf litter, woody debris, and small patches of moss cover most of the soil surface. *Picea glauca* and *Populus balsamifera* seedlings are occasional to common in many stands.

Setting

Distribution and extent: river corridor throughout the survey area; minor extent
Elevation: 1,900 to 2,900 feet (579 to 884 m)
Landforms: level flood plains; frequently immediately adjacent to the river channel; terrace height is usually less than 4 feet (less than 1.2 m)
Principal soils: Tangoe and Dackey
Depth to seasonally high water table: variable; ranges from 10 to 60 inches (25 to 152 cm)
Flooding frequency: frequent to occasional

Successional Status

Salix alaxensis is a rapidly growing pioneering species on flood plains, and well adapted to frequent flooding and siltation. This species also appears to be relatively short lived and intolerant of canopy competition.

Tall feltleaf willow scrub is an early seral stage of flood plain succession in both the alder and willow zones. Within the willow zone, this cover type typically occurs as stands of small extent on gravelly and silty bars immediately adjacent to the channel. Within the alder zone, Tall feltleaf willow scrub along with Tall feltleaf willow/alder scrub occur spatially and successionally between Sparsely vegetated alluvium and the Thinleaf alder scrub cover types.

Riparian-Wetland Status

Classification: Palustrine scrub-shrub, seasonally flooded, mineral (*Cowardin et al. 1979*); riparian

Tall feltleaf willow scrub
Salix alaxensis scrub
SAAL

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T2	22	4	3	5	9
Picea glauca	T3	56	2	1	5	11
Populus balsamifera	T3	11	15	15	15	13
Potentilla fruticosa	S3	56	4	1	15	15
Salix alaxensis	S2	100	41	20	70	64
Salix reticulata	S4	11	1	1	1	3
Salix spp.	S3	89	40	10	70	60
Vaccinium uliginosum	S3	56	2	1	5	11
Aconitum delphiniifolium	F	22	1	1	2	4
Artemisia tilesii	F	56	1	1	1	6
Aster sibiricus	F	78	1	1	1	8
Astragalus americanus	F	11	1	1	1	3
Astragalus bodinii	F	11	10	10	10	11
Astragalus spp.	F	22	5	2	7	10
Epilobium angustifolium	F	67	2	1	10	13
Epilobium latifolium	F	11	5	5	5	7
Equisetum hyemale	F	11	1	1	1	2
Equisetum spp.	F	89	20	1	60	42
Erigeron acris	F	22	1	1	1	5
Galium boreale	F	33	1	1	1	5
Gentiana spp.	F	11	1	1	1	2
Hedysarum alpinum	F	78	3	1	7	15
Mertensia paniculata	F	11	5	5	5	7
Parnassia palustris	F	67	2	1	7	12
Polemonium acutiflorum	F	33	3	1	5	10
Potentilla palustris	F	11	10	10	10	11
Pyrola spp.	F	44	1	1	1	5
Rubus arcticus	F	78	3	1	15	16
Sanguisorba stipulata	F	33	4	1	5	11
Swertia perennis	F	22	7	3	10	12
Valeriana spp.	F	11	1	1	1	3
Viola spp.	F	22	1	1	1	4
Agropyron trachycaulum	G	22	1	1	1	4
Agrostis scabra	G	22	1	1	1	4
Arctagrostis latifolia	G	33	4	2	5	12
Calamagrostis canadensis	G	78	14	2	40	33
Carex aquatilis	G	11	3	3	3	6
Carex spp.	G	44	2	1	5	8
Festuca spp.	G	22	3	1	4	8
Hierochloe odorata	G	22	2	1	3	6
Poa spp.	G	33	3	2	5	10
Moss layer	M	100	21	1	50	46
Lichen layer	L	56	10	1	40	23
Bare soil	B	67	1	1	3	8
Litter and mulch	B	100	26	1	80	51
Rock fragments	B	33	20	1	60	26
Surface water	B	22	3	1	5	8
Woody litter (>1" dia.)	B	44	4	1	5	13

Salix spp. includes: SABA3, SAPL2
Number of stands = 9
ctsumtab

Tall feltleaf willow/alder scrub

***Salix alaxensis / Alnus tenuifolia* scrub**
SAAL2
(Figure 6)

Description

Tall feltleaf willow/alder scrub consists of sparse to moderately closed willow 3 to 10 feet (0.9 to 3.0 m) in height. Lower layers include a sparse to open layer of low willows and alder and an open to moderately closed herb layer.

The tall willow layer is composed primarily of *Salix alaxensis*; canopy cover is highly variable, ranging from less than 15 percent in some stands to as much as 90 percent in others. The low shrub layer ranges from 10 to 30 percent canopy cover and is composed of small *Alnus tenuifolia* and a variety of willows, primarily *S. barclayi*, *S. planifolia*, and *S. monticola*. Most stands also have common *Populus balsamifera* and *Picea glauca* seedlings. Other shrubs are generally of minor importance. The composition and abundance of the herb layer is variable, depending in part on the canopy closure of the shrub layers. Herb cover ranges from 30 to 65 percent in most stands. Important herbs include *Calamagrostis canadensis*, *Arctagrostis latifolia*, *Agropyron trachycaulum*, *Hedysarum alpinum*, *Aster sibiricus*, *Artemisia tilesii*, and *Astragalus* spp. Bare soil dominates the ground surface with only occasional small patches of moss and scattered leaf litter.

Setting

Distribution and extent: river corridor within the alder zone; minor extent
Elevation: 1,850 to 2,400 feet (564 to 732 m)
Landforms: level point bars on flood plains; terrace height ranges from 1 to 5 feet (0.3 to 1.5 m)
Principal soils: Dackey and Kluna, frequently flooded
Depth to seasonally high water table: variable; ranges from 24 to 50 inches (61 to 127 cm)
Flooding frequency: frequent

Successional Status

Tall feltleaf willow/alder scrub appears in most places to have developed from Sparsely vegetated alluvium. *Alnus tenuifolia* apparently invades or establishes in the stand somewhat later than *Salix alaxensis*. Over time the taller, but slower growing and longer lived, alder will overtop and replace the willow in abundance. This type is an early seral stage of flood plain succession in the alder zone only. Tall feltleaf willow/alder scrub occurs spatially and successionally between Sparsely vegetated alluvium and the thinleaf alder scrub types.

Riparian-Wetland Status

Classification: Palustrine scrub-shrub, seasonally flooded, mineral (*Cowardin et al*. 1979); riparian

Tall feltleaf willow/alder scrub

***Salix alaxensis / Alnus tenuifolia* scrub**

SAAL2

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T3	43	1	1	3	8
Populus balsamifera	T3	57	12	1	30	26
Alnus tenuifolia	S3	100	7	2	15	26
Arctostaphylos rubra	S4	14	3	3	3	7
Potentilla fruticosa	S3	14	8	8	8	11
Salix alaxensis	S2	100	47	10	90	69
Salix arbusculoides	S2	43	1	1	1	5
Salix bebbiana	S2	14	15	15	15	15
Salix spp.	S3	86	8	1	25	26
Shepherdia canadensis	S3	29	1	1	1	4
Aconitum delphiniifolium	F	43	1	1	1	5
Artemisia tilesii	F	71	5	1	10	19
Aster sibiricus	F	100	4	1	10	20
Astragalus bodinii	F	29	6	2	10	13
Astragalus spp.	F	57	6	1	20	19
Epilobium angustifolium	F	57	3	1	7	13
Epilobium latifolium	F	29	2	1	3	7
Epilobium palustre	F	14	1	1	1	3
Equisetum fluviatile	F	14	2	2	2	5
Equisetum palustre	F	43	3	1	5	10
Equisetum spp.	F	43	2	1	3	8
Erigeron acris	F	14	1	1	1	3
Gentiana spp.	F	29	1	1	1	4
Hedysarum alpinum	F	86	3	1	10	16
Mertensia paniculata	F	14	1	1	1	3
Parnassia palustris	F	86	1	1	2	10
Petasites frigidus	F	14	1	1	1	3
Platanthera hyperborea	F	43	1	1	1	5
Polemonium acutiflorum	F	14	3	3	3	7
Rubus arcticus	F	43	2	1	3	10
Valeriana spp.	F	14	1	1	1	3
Viola spp.	F	14	1	1	1	3
Agropyron trachycaulum	G	71	5	1	15	19
Agrostis scabra	G	57	1	1	2	7
Arctagrostis latifolia	G	43	13	1	30	24
Calamagrostis canadensis	G	57	13	3	40	27
Carex aquatilis	G	14	2	2	2	5
Carex lugens	G	14	3	3	3	7
Carex spp.	G	14	10	10	10	12
Festuca spp.	G	29	3	1	5	9
Hierochloe odorata	G	29	1	1	2	6
Juncus spp.	G	29	1	1	1	4
Poa spp.	G	71	2	1	5	13
Trisetum spicatum	G	14	1	1	1	3
Moss layer	M	86	10	1	20	30
Lichen layer	L	14	5	5	5	8
Bare soil	B	100	64	30	80	80
Litter and mulch	B	100	25	5	55	50
Rock fragments	B	43	4	1	10	13
Surface water	B	14	5	5	5	8
Woody litter (>1" dia.)	B	100	1	1	1	7

Salix spp. includes: SABA3, SAMO2, SANO2, SAPL2

Number of stands = 7

ctsumtab

Tall green alder scrub

***Alnus crispa* scrub**

ALNUS

(Figure 15)

Description

Tall green alder scrub consists of scattered tall and medium *Picea glauca* (occasionally *P. mariana*) protruding through an open to moderately closed tall shrub layer dominated by *Alnus crispa* (occasionally *A. tenuifolia*). *Salix glauca* also is a common to well-represented tall shrub in many stands. The tall shrub layer ranges from 25 to 70 percent canopy cover and 7 to 12 feet (2.1 to 3.7 m) in height. Trees are usually less than 10 percent canopy cover and range in height from less than 20 to 40 feet (less than 6.1 to 12.2 m).

Medium and low shrubs form an open to closed secondary shrub layer 3 to 6 feet (0.9 to 1.8 m) in height. Important medium and low shrubs include *Betula glandulosa*, *Salix planifolia*, *Ledum* spp., and *Vaccinium uliginosum*. Dwarf shrubs, primarily *V. vitis-idaea*, also are common in many stands.

Except for *Equisetum* spp., which is abundant in many stands, herbs are generally only a minor component in Tall green alder scrub. Mosses, litter, and woody debris cover much of the ground surface.

Setting

Distribution and extent: scattered locations at middle and higher elevations in the uplands; minor extent

Elevation: 2,200 to 3,400 feet (671 to 1,036 m)

Landforms: moderately steep to very steep hill slopes; usually in the transition zone between lower elevation lacustrine terraces and till plains and higher bedrock controlled mountains (Rock outcrops are common in many areas occupied by this cover type.)

Principal soils: Nickolna and Cobblank; organic mat thickness typically about 5 inches (12.7 cm) or less

Depth to permafrost: typically more than 60 inches (more than 152 cm)

Depth to seasonally high water table: typically more than 60 inches (more than 152 cm) below mineral surface

Successional Status

Tall alder scrub is restricted to a relatively narrow zone on hill and mountain slopes, sites that probably are subject to some degree of downslope movement and mass wasting. This type occurs in complex with Spruce/shrub birch woodland and Low shrub birch scrub. This complex of cover types appears to be the potential on these sites.

Riparian-Wetland Status

Classification: upland

Tall green alder scrub
Alnus crispa scrub
ALNUS

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T1	25	3	3	3	9
Picea glauca	T2	100	5	1	10	23
Alnus crispa	S2	100	33	15	70	57
Arctostaphylos rubra	S4	50	1	1	2	8
Betula glandulosa	SM	100	36	5	70	60
Cassiope tetragona	S4	25	4	4	4	10
Empetrum nigrum	S4	100	4	1	7	19
Juniperus communis ssp. nana	S4	25	1	1	1	5
Ledum spp.	S3	100	20	10	35	45
Ribes spp.	S3	25	1	1	1	4
Rosa acicularis	S3	25	1	1	1	4
Salix glauca	SM	50	19	7	30	30
Salix spp.	SM	100	12	2	20	34
Spiraea beauverdiana	S3	50	4	1	7	14
Vaccinium uliginosum	S3	100	20	15	30	45
Vaccinium vitis-idaea	S4	100	8	5	15	28
Anemone spp.	F	25	1	1	1	4
Boschniakia rossica	F	25	1	1	1	4
Claytonia sarmentosa	F	25	1	1	1	4
Cornus canadensis	F	50	12	3	20	24
Equisetum spp.	F	50	14	2	25	26
Linnaea borealis	F	50	1	1	1	7
Lycopodium spp.	F	50	3	2	3	11
Mertensia paniculata	F	25	1	1	1	4
Petasites frigidus	F	25	1	1	1	4
Polygonum bistorta	F	50	2	1	3	10
Stellaria spp.	F	25	1	1	1	4
Arctagrostis latifolia	G	50	2	1	3	9
Calamagrostis canadensis	G	25	1	1	1	4
Carex lugens	G	25	2	2	2	7
Carex spp.	G	50	5	1	10	16
Juncus spp.	G	25	1	1	1	4
Moss layer	M	100	61	25	90	78
Lichen layer	L	75	9	1	15	25
Bare soil	B	25	4	4	4	10
Litter and mulch	B	100	14	1	45	37
Rock fragments	B	75	3	1	6	14
Surface water	B	25	1	1	1	4
Woody litter (>1" dia.)	B	50	10	5	15	22

Salix spp. includes: SAMO2, SAPL2
Number of stands = 4
ctsumtab

Tall thinleaf alder scrub

***Alnus tenuifolia* scrub**

ALTE2

(Figure 6; Plate 5—lower photo)

Description

Tall thinleaf alder scrub consists of occasionally open to closed alder 10 to 20 feet (3.0 to 6.1 m) in height. Lower layers include an open to moderately open low shrub layer in most stands and a moderately open to closed herb layer.

Canopy cover of the tall alder layer typically ranges from 55 to 90 percent, although more open stands are frequently encountered. This layer is dominated by *Alnus tenuifolia*, and *Salix alaxensis* is common in many stands. Canopy cover of the low shrub layer generally ranges from 20 to 50 percent. Important species include *Salix barclayi*, *S. monticola*, and *Rosa acicularis*. *Potentilla fruticosa* is common in some stands. *Calamagrostis canadensis* and *Arctagrostis latifolia*, which dominate the herb layer, are generally about as tall as and intermixed with the low shrub layer. Other important tall herbs include *Epilobium latifolium* and *Artemisia tilesii*. *Equisetum* spp. are abundant medium herbs in most stands. Herb canopy cover generally ranges from around 40 to more than 90 percent. Seedlings of *Picea glauca* and *Populus balsamifera* are common to well-represented in the herb layer in most stands. The ground surface is covered with leaf litter and grass mulch.

Setting

Distribution and extent: river corridor within the alder zone; moderate extent
Elevation: 1,850 to 2,400 feet (564 to 732 m)
Landforms: nearly level flood plains; terrace height from 2 to 6 feet (0.6 to 1.8 m)
Principal soils: Dackey and Kluna, deep
Depth to seasonally high water table: variable; ranges from occasionally less than 20 inches to 60 inches (less than 51 to 152 cm)
Flooding frequency: occasional

Successional Status

Tall thinleaf alder scrub is an early seral stage in flood plain succession in the alder zone. Compared with Tall thinleaf alder/willow scrub and Tall thinleaf alder-feltleaf willow scrub, in Tall thinleaf alder scrub *Alnus tenuifolia* has over topped the willows and *Salix alaxensis* is showing signs of dying out. Seedlings and saplings of later forest stages are developing in the alder understory. Along the edges with adjacent forest types, small *Populus balsamifera* and *Picea glauca* trees are common.

Riparian-Wetland Status

Classification: riparian

Tall thinleaf alder scrub
Alnus tenuifolia scrub
ALTE2

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T2	15	9	8	10	12
Picea glauca	T3	54	2	1	5	10
Populus balsamifera	T3	31	1	1	2	7
Alnus tenuifolia	S2	100	67	20	95	82
Potentilla fruticosa	S3	31	2	1	4	7
Rosa acicularis	S3	54	3	1	7	14
Salix alaxensis	S2	77	10	4	15	28
Salix spp.	S3	62	6	1	10	19
Shepherdia canadensis	S3	15	1	1	1	3
Aconitum delphiniifolium	F	31	1	1	1	4
Artemisia tilesii	F	62	4	1	15	15
Aster sibiricus	F	62	2	1	7	12
Epilobium angustifolium	F	92	3	1	15	17
Equisetum spp.	F	92	10	1	40	30
Galium boreale	F	31	2	1	5	7
Hedysarum alpinum	F	31	4	1	8	12
Mertensia paniculata	F	23	2	1	3	6
Petasites frigidus	F	23	2	1	3	7
Polemonium acutiflorum	F	23	1	1	2	5
Pyrola spp.	F	15	1	1	1	3
Rubus arcticus	F	23	13	1	30	17
Unknown forb	F	15	1	1	1	3
Agrostis scabra	G	23	1	1	1	4
Arctagrostis latifolia	G	46	10	2	30	21
Calamagrostis canadensis	G	46	34	5	70	40
Carex aquatilis	G	15	8	1	15	11
Carex lugens	G	15	5	3	7	9
Poa spp.	G	38	50	1	85	44
Moss layer	M	92	16	1	70	39
Lichen layer	L	54	3	1	15	12
Bare soil	B	54	8	1	45	21
Litter and mulch	B	100	55	1	95	74
Woody litter (>1" dia.)	B	77	6	2	15	22

Salix spp. includes: SABA3, SAMO2, SAPL2
Number of stands = 13
ctsumtab

Tall thinleaf alder-feltleaf willow scrub

***Alnus tenuifolia-Salix alaxensis* scrub**

ALTE2-SAAL

(Figure 5; Plate 11—upper photo)

Description

Tall thinleaf alder-feltleaf willow scrub consists of moderately open to closed stands of mixed *Alnus tenuifolia* and *Salix alaxensis* 10 to 20 feet (3.0 to 6.1 m) in height. Lower layers include a sparse to occasionally open low shrub layer and a sparse to moderately open herb layer.

Canopy cover of the *Alnus tenuifolia-Salix alaxensis* layer ranges from 25 to more than 90 percent. Low shrub canopy cover is usually fairly sparse, ranging from around 10 percent to occasionally as much as 25 percent. Important low shrubs include *Salix barclayi*, *S. monticola*, *Potentilla fruticosa*, and *Rosa acicularis*. The herb layer is dominated by *Calamagrostis canadensis* and *Arctagrostis latifolia*, which are generally as tall or taller than, and intermixed with, the low shrubs. Other important herbs include *Epilobium angustifolium*, *Agropyron trachycaulum*, *Artemisia tilesii*, *Polemonium acutiflorum*, *Equisetum* spp., *Aster sibiricus*, and *Hedysarum alpinum*. Seedling and saplings of *Populus balsamifera* and *Picea glauca* are common in most stands. Leaf litter and herb mulch cover much of the soil surface.

Setting

Distribution and extent: river corridor throughout the alder zone; moderate extent
Elevation: 1,900 to 2,400 feet (579 to 732 m)
Landforms: level to nearly level flood plains; terrace height from 2 to 7 feet (0.6 to 2.1 m)
Principal soils: Dackey and Kluna
Depth to seasonally high water table: variable; ranges from less than 20 to greater than 60 inches (less than 51 to greater than 152 cm)
Flooding frequency: frequent to occasional

Successional Status

Tall thinleaf alder-feltleaf willow scrub is an early seral stage of flood plain succession in the alder zone. It appears to develop directly from the Tall feltleaf willow and Tall feltleaf willow/alder scrub types. In Tall thinleaf alder-feltleaf willow scrub, *Alnus tenuifolia* and *Salix alaxensis* occupy approximately the same shrub canopy level. Over time, the alder will continue to increase in height and the willow will begin to die out, leading to Tall thinleaf alder scrub. Seedlings and saplings of *Populus balsamifera* and *Picea glauca* are already present in the Tall thinleaf alder-feltleaf willow scrub stage.

Riparian-Wetland Status

Classification: riparian

Tall thinleaf alder-feltleaf willow scrub

Alnus tenuifolia-Salix alaxensis **scrub**

ALTE2-SAAL

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T2	14	5	4	5	8
Populus balsamifera	T2	14	3	1	4	6
Picea glauca	T3	45	2	1	5	9
Populus balsamifera	T3	41	8	1	20	18
Alnus tenuifolia	S2	100	44	15	70	66
Potentilla fruticosa	S3	36	3	1	8	11
Rosa acicularis	S3	32	5	1	15	13
Salix alaxensis	S2	100	37	10	75	61
Salix arbusculoides	S2	18	7	1	25	11
Salix spp.	S3	55	5	1	20	17
Shepherdia canadensis	S3	23	2	1	5	7
Viburnum edule	S3	18	3	1	5	7
Artemisia tilesii	F	77	9	1	30	26
Aster sibiricus	F	73	3	1	10	16
Epilobium angustifolium	F	64	11	2	40	27
Equisetum spp.	F	45	13	1	40	24
Galium boreale	F	23	2	1	3	7
Hedysarum alpinum	F	59	4	1	10	15
Mertensia paniculata	F	18	4	1	5	8
Parnassia palustris	F	36	1	1	4	7
Petasites frigidus	F	14	1	1	1	3
Polemonium acutiflorum	F	32	2	1	7	7
Pyrola spp.	F	14	2	1	4	5
Rubus arcticus	F	18	4	1	10	9
Sanguisorba stipulata	F	14	3	2	4	7
Unknown forb	F	14	1	1	2	4
Viola spp.	F	14	3	1	4	6
Agropyron spp.	G	23	2	1	3	6
Agropyron trachycaulum	G	32	6	1	10	14
Agrostis scabra	G	18	1	1	2	4
Arctagrostis latifolia	G	32	14	1	55	21
Calamagrostis canadensis	G	55	29	1	85	40
Hierochloe odorata	G	23	1	1	4	6
Poa spp.	G	68	7	1	35	21
Moss layer	M	100	7	1	15	26
Lichen layer	L	73	1	1	3	7
Bare soil	B	73	13	1	85	30
Litter and mulch	B	95	44	1	95	64
Rock fragments	B	18	2	1	8	7
Woody litter (>1" dia.)	B	64	6	1	20	20

Salix spp. includes: SABA3, SAMO2, SANO2, SAPL2

Number of stands = 22

ctsumtab

Tall thinleaf alder/willow scrub
***Alnus tenuifolia / Salix* spp. scrub**
ALTE2/SALIX

Description

Tall thinleaf alder/willow scrub consists of open to closed stands of mixed *Alnus tenuifolia* 8 to 15 feet (2.4 to 4.6 m) in height, and somewhat shorter *Salix* spp., with an open to moderately closed herb layer below.

Canopy cover of the alder/willow layer ranges from 25 to more than 90 percent. Important willows include *Salix barclayi*, *S. planifolia*, and *S. monticola*. In most stands, *Potentilla fruticosa* and *Rosa acicularis* are common low shrubs, and seedlings and saplings of *Populus balsamifera* and *Picea glauca* are common. *Calamagrostis canadensis*, *Arctagrostis latifolia*, and other tall and medium herbs dominate the herb layer. Other important herbs include *Equisetum* spp., *Epilobium angustifolium*, *Artemisia tilesii*, *Aster sibiricus*, *Hedysarum alpinum*, *Poa* spp., and *Rubus arcticus*. In depressions and other wet microsites, *Carex aquatilis* often is well-represented to abundant. Leaf litter and herb mulch cover much of the soil surface.

Setting

Distribution and extent: river corridor throughout the alder zone; moderate extent
Elevation: 1,900 to 2,400 feet (579 to 732 m)
Landforms: level to nearly level point bars on flood plains; range in terrace height—generally from 2 to 4 feet (0.6 to 1.2 m)
Principal soils: Dackey
Depth to seasonally high water table: variable; ranges from less than 20 to greater than 60 inches (less than 51 to greater than 152 cm)
Flooding frequency: occasional to frequent in many places

Successional Status

Tall thinleaf alder/willow scrub is an early seral stage of flood plain succession in the alder zone. It appears to develop directly from Low willow/herb scrub. Over time, the alder will continue to increase in height and relative canopy cover and the willow will decease in abundance, leading to Tall thinleaf alder scrub. Seedlings and saplings of *Populus balsamifera* and *Picea glauca* are already present in Tall thinleaf alder-willow scrub.

Riparian-Wetland Status

Classification: riparian

Tall thinleaf alder/willow scrub
***Alnus tenuifolia / Salix* spp. scrub**
ALTE2/SALIX

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T2	21	3	1	5	8
Populus balsamifera	T2	25	2	1	5	7
Picea glauca	T3	58	3	1	10	13
Populus balsamifera	T3	50	2	1	8	11
Alnus tenuifolia	S2	100	64	20	90	80
Potentilla fruticosa	S3	58	4	1	7	15
Rosa acicularis	S3	46	4	1	15	13
Salix alaxensis	S2	63	15	5	50	30
Salix arbusculoides	S2	13	3	1	5	6
Salix bebbiana	S2	13	10	5	15	11
Salix spp.	S3	100	44	15	85	66
Shepherdia canadensis	S3	25	2	1	5	7
Vaccinium uliginosum	S3	13	1	1	2	4
Aconitum delphiniifolium	F	63	1	1	2	7
Anemone spp.	F	33	1	1	2	6
Artemisia tilesii	F	50	5	1	15	15
Aster sibiricus	F	75	3	1	5	14
Astragalus spp.	F	13	5	2	7	8
Epilobium angustifolium	F	88	3	1	15	16
Equisetum spp.	F	67	12	2	40	28
Galium boreale	F	33	3	1	5	9
Gentiana spp.	F	13	1	1	1	3
Hedysarum alpinum	F	54	4	1	10	15
Mertensia paniculata	F	13	1	1	1	3
Parnassia palustris	F	54	1	1	1	6
Polemonium acutiflorum	F	38	1	1	2	6
Potentilla palustris	F	13	4	1	10	7
Pyrola spp.	F	17	1	1	3	4
Rubus arcticus	F	67	2	1	5	13
Valeriana spp.	F	21	1	1	2	5
Viola spp.	F	17	1	1	1	3
Agropyron trachycaulum	G	25	2	1	4	7
Arctagrostis latifolia	G	79	11	1	70	30
Calamagrostis canadensis	G	50	24	2	70	35
Carex aquatilis	G	29	19	1	45	24
Carex lugens	G	21	4	2	10	10
Hierochloe odorata	G	13	1	1	2	4
Poa spp.	G	29	9	1	45	16
Moss layer	M	100	14	1	55	37
Lichen layer	L	75	2	1	5	11
Bare soil	B	67	7	1	40	22
Litter and mulch	B	100	70	30	95	83
Surface water	B	13	2	1	5	5
Woody litter (>1" dia.)	B	96	6	1	20	24

Salix spp. includes: SABA3, SAMO2, SANO2, SAPL2
Number of stands = 24
ctsumtab

White spruce forest
***Picea glauca* forest**
PIGL

Description

White spruce forest primarily consists of open to moderately closed stands of *Picea glauca* with occasional *Populus balsamifera*, *P. tremuloides*, and, in a few locations, *Betula papyrifera*. Forest canopy cover ranges from 25 to 65 percent. Trees range in height from 25 to 60 feet (7.6 to 18.3 m) or more. Tree basal area in one sample stand was 160 $feet^2$/acre (36.7 m^2/ha).

Understory composition and structure varies considerably in White spruce forest. Most stands have a sparse to open low shrub layer dominated by *Ledum* spp. and *Vaccinium uliginosum*. In other stands, *Rosa acicularis* or *Shepherdia canadensis* are the most important low shrubs. *Salix bebbiana* and other willows form a prominent tall shrub layer in some stands. The ground layer consists of sparse to well-represented dwarfs shrubs and herbs in a nearly continuous cover of feathermoss. Important dwarf shrubs and herbs include *Vaccinium vitis-idaea*, *Empetrum nigrum*, *Epilobium angustifolium*, *Geocaulon lividum*, and *Linnaea borealis*.

Setting

Distribution and extent: widely distributed in scattered locations within the lower the river corridor; minor extent
Elevation: 1,900 to 2,500 feet (579 to 762 m)
Landforms: moderately steep to very steep escarpments
Principal soils: Cryorthents and Cryochrepts; surface organic mat—usually less than 5 inches (less than 13 cm) thick
Depth to permafrost: typically greater than 60 inches (greater than 152 cm)
Depth to seasonally high water table: greater than 60 inches (greater than 152 cm)

Successional Status

White spruce forest is probably late seral vegetation on stable, moist escarpments. This type has greater abundance and cover of shrubs and herbs, but otherwise is similar to White spruce/moss on stream terraces.

Riparian-Wetland Status

Classification: upland

White spruce forest

Picea glauca forest

PIGL

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Betula papyrifera	T1	20	1	1	1	3
Picea glauca	T1	80	40	15	65	57
Picea spp.	T1	20	45	45	45	30
Populus balsamifera	T1	60	2	1	3	10
Populus tremuloides	T1	20	4	4	4	9
Picea glauca	T2	20	15	15	15	17
Picea glauca	T3	40	5	1	10	14
Picea mariana	T3	20	5	5	5	10
Picea spp.	T3	20	10	10	10	14
Populus balsamifera	T3	40	2	1	4	9
Alnus crispa	S2	20	4	4	4	9
Arctostaphylos rubra	S4	60	4	3	7	16
Arctostaphylos uva-ursi	S4	20	1	1	1	3
Empetrum nigrum	S4	80	10	2	25	28
Ledum spp.	S3	60	13	3	20	28
Potentilla fruticosa	S3	40	8	5	10	17
Ribes triste	S3	60	1	1	1	7
Rosa acicularis	S3	100	2	1	7	14
Salix arbusculoides	SM	40	2	1	3	8
Salix bebbiana	S2	20	18	18	18	19
Salix glauca	S2	20	5	5	5	10
Salix myrtillifolia	S4	80	5	2	7	19
Salix spp.	S3	60	8	4	10	22
Shepherdia canadensis	S3	100	5	1	15	23
Vaccinium uliginosum	S3	80	8	2	15	25
Vaccinium vitis-idaea	S4	100	10	2	20	32
Aster sibiricus	F	40	3	1	5	10
Astragalus bodinii	F	20	1	1	1	4
Boschniakia rossica	F	20	1	1	1	3
Corallorrhiza trifida	F	20	1	1	1	3
Cornus canadensis	F	20	1	1	1	4
Epilobium angustifolium	F	80	2	1	7	13
Equisetum scirpoides	F	20	4	4	4	9
Equisetum spp.	F	60	1	1	3	9
Geocaulon lividum	F	60	5	1	15	18
Hedysarum alpinum	F	60	2	1	6	12
Linnaea borealis	F	60	9	2	20	23
Lupinus arcticus	F	20	3	3	3	8
Mertensia paniculata	F	40	1	1	1	5
Moneses uniflora	F	20	1	1	1	3
Parnassia palustris	F	20	1	1	1	3
Polemonium acutiflorum	F	20	1	1	1	3
Pyrola spp.	F	40	1	1	1	4
Senecio spp.	F	60	1	1	2	7
Arctagrostis latifolia	G	20	4	4	4	9
Calamagrostis canadensis	G	40	1	1	1	5
Carex spp.	G	20	1	1	1	3
Moss layer	M	100	74	55	90	86
Lichen layer	L	100	7	1	15	27
Bare soil	B	60	2	1	3	9
Litter and mulch	B	100	10	3	24	32
Rock fragments	B	20	1	1	1	3
Woody litter (>1" dia.)	B	60	5	2	7	18

Salix spp. includes: SABA3, SAPL2

Number of stands = 5

ctsumtab

White spruce/ericaceous shrub open forest

***Picea glauca* / ericaceous shrub open forest**

PIGL/erica

Description

White spruce/ericaceous shrub open forest consists of a woodland to open tall tree layer of mostly decadent *Picea glauca* and a lower woodland to open tree layer of younger, slower growing *P. glauca*. *P. mariana* codominates the lower tree layer in some stands. Trees range from 40 to 70 feet (12.2 to 21.3 m) in height in the upper layer and from 20 to 35 feet (6.1 to 10.7 m) in height in the secondary layer. Total tree canopy cover ranges from 20 to 55 percent in most stands, and up to 70 percent on occasion. Tree basal area in 15 sample stands ranged from 62 to 200 feet^2/acre (14.2 to 45.9 m^2/ha).

The aspect of the understory is dominated by an open to moderately closed layer of low ericaceous shrubs. *Vaccinium uliginosum*, *V. vitis-idaea*, *Ledum* spp., *Empetrum nigrum*, and *Arctostaphylos rubra* are all common to abundant. In many stands, *Rosa acicularis*, *Betula glandulosa*, and *Salix* spp. also are important. Low shrub canopy cover generally ranges from 30 to 65 percent. Height of the low shrub layer is typically between 2 and 4 feet (0.6 and 1.2 m).

The ground layer is dominated by mosses and lichen characteristic of boreal spruce forests. Herbs are generally only common to occasionally abundant. Important herbs include *Equisetum* spp., *Calamagrostis canadensis*, *Arctagrostis latifolia*, and *Petasites frigidus*. Herbaceous litter and mulch is common, and in places woody litter consisting of medium and large diameter boles of fallen trees is abundant.

Setting

Distribution and extent: primarily along the Main Stem south of Canyon Rapids and the West Fork, occasional elsewhere within the river corridor; moderate extent

Elevation: 1,900 to 2,600 feet (579 to 792 m)

Landforms: level to occasionally moderately sloping stream terraces; terrace height—generally from 4 to 15 feet (1.2 to 4.6 m)

Principal soils: Hogan; occasionally Maclaren and other soils on stream terraces

Occurrence of permafrost: present in most stands from 10 to 60 inches (25 to 152 cm) below the mineral surface; occasionally absent

Depth to seasonally high water table: water table usually absent; occasionally a thin layer of saturated soil occurs at the permafrost contact

Flooding frequency: none to rare

Successional Status

White spruce/ericaceous shrub open forest represents a transitional stage between White spruce/thinleaf alder open forest (and occasionally White spruce/willow open forest)—the late seral stage of flood plain succession, and Spruce/shrub birch woodland—the major cover type on adjacent stream terraces. In White spruce/ericaceous open forest, the productive *Picea glauca* overstory is dying out and being replaced by a less productive stand of mixed *P. glauca* and *P. mariana*. Flood plain understory species are decreased in abundance while ericaceous shrub, mosses, and other upland species are increased. Changes in the vegetation are likely the effects of the development of permafrost within the soil profile.

Riparian-Wetland Status

Classification: upland

White spruce/ericaceous shrub open forest
Picea glauca / ericaceous shrub open forest
PIGL/erica

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T1	97	28	10	65	52
Populus balsamifera	T1	15	2	1	5	6
Picea glauca	T2	35	19	3	40	26
Picea glauca	T3	56	4	1	10	15
Populus balsamifera	T3	18	2	1	10	6
Alnus tenuifolia	S2	15	5	1	10	8
Arctostaphylos rubra	S4	59	4	1	10	15
Betula glandulosa	SM	38	6	1	20	15
Empetrum nigrum	S4	100	11	1	35	34
Ledum spp.	S3	88	20	1	45	42
Potentilla fruticosa	S3	59	1	1	5	9
Rosa acicularis	S3	62	4	1	15	15
Salix alaxensis	S2	32	5	1	20	13
Salix arbusculoides	S2	12	3	1	5	6
Salix glauca	S2	44	8	1	25	18
Salix myrtillifolia	S4	26	2	1	3	7
Salix reticulata	S4	21	1	1	3	5
Salix spp.	SM	82	7	1	15	23
Shepherdia canadensis	S3	35	5	1	15	13
Vaccinium uliginosum	S3	97	23	2	55	48
Vaccinium vitis-idaea	S4	100	14	1	45	37
Astragalus spp.	F	15	1	1	3	5
Epilobium angustifolium	F	50	1	1	4	7
Equisetum scirpoides	F	15	1	1	1	3
Equisetum spp.	F	79	7	1	45	23
Geocaulon lividum	F	32	3	1	10	9
Hedysarum alpinum	F	41	3	1	7	10
Mertensia paniculata	F	18	2	1	3	6
Petasites frigidus	F	62	2	1	7	12
Pyrola spp.	F	21	2	1	4	6
Rubus arcticus	F	24	1	1	3	5
Valeriana spp.	F	29	1	1	1	4
Arctagrostis latifolia	G	71	3	1	10	14
Calamagrostis canadensis	G	47	3	1	10	12
Carex lugens	G	21	3	1	7	8
Carex spp.	G	21	2	1	4	6
Moss layer	M	100	66	20	85	81
Lichen layer	L	100	10	1	40	31
Bare soil	B	32	2	1	5	8
Litter and mulch	B	100	15	1	55	38
Woody litter (>1" dia.)	B	91	6	1	20	24

Salix spp. includes: SABA3, SAMO2, SAPL2
Number of stands = 34
ctsumtab

White spruce/moss forest
***Picea glauca* / moss forest**

Description

White spruce/moss forest consists of moderately open to moderately closed *Picea glauca,* with an understory dominated by a nearly continuous carpet of feathermoss. Forest canopy cover ranges from 40 to 65 percent. The predominant kinds of feathermoss are *Hylocomium splendens, Pleurozium schreberi,* and *Tomentypnum nitens.* Understory shrubs and herbs generally are sparse. Common species often include *Rosa acicularis*, *Vaccinium vitis-idaea*, *Shepherdia canadensis*, *Linnaea borealis*, and *Geocaulon lividum*.

Setting

Distribution and extent: Main Stem below the canyon and lower West Fork; minor extent
Elevation: 1,900 to 2,200 feet (579 to 671 m)
Landforms: nearly level high flood plains and low stream terraces
Soils: not described
Flooding frequency: rare to none

Successional Status

White spruce/moss forest represents a late seral stage of succession on flood plains. This type apparently only develops under a dense *Picea glauca* canopy, and where flooding is rare.

Riparian-Wetland Status

Classification: upland

White spruce/moss forest
Picea glauca / moss forest

Species Summary for a Representative Stand

Trees	Cover
Picea glauca	60
Populus balsamifera	tr
Populus tremuloides	tr
Tree seedlings/shrubs	
Alnus spp.	tr
Arctostaphylos rubra	2
Arctostaphylos uva-ursi	tr
Empetrum nigrum	2
Ledum groenlandicum	tr
Picea glauca	3
Populus balsamifera	tr
Ribes spp.	tr
Rosa acicularis	2
Salix spp.	7
Shepherdia canadensis	5
Vaccinium vitis-idaea	3
Viburnum edule	2
Herbs	
Calamagrostis spp.	tr
Cornus canadensis	tr
Equisetum spp.	2
Equisetum scirpoides	1
Geocaulon lividum	7
Hedysarum alpinum	3
Linnaea borealis	9
Lupinus arcticus	4
Mertensia paniculata	tr
Pyrola spp.	1
Ground layer	
feathermoss	80
lichen	8
litter	18

White spruce/thinleaf alder open forest
Picea glauca / Alnus tenuifolia **open forest**
PIGL/ALTE2
(Figure 6; Plate 11—upper photo)

Description

White spruce/thinleaf alder open forest consists of open to occasionally moderately closed stands of *Picea glauca*. Many stands also have scattered *Populus balsamifera*. Tree canopy cover ranges from 25 to 70 percent. Occasional woodland stands (10 to 25 percent tree canopy cover) also occur. In the most productive stands, mature white spruce trees are typically 60 to 75 feet (18 to 23 m) in height and 10 to 15 inches (25 to 38 cm) in diameter at breast height. Occasional trees over 80 feet (24 m) in height and 17.5 inches (45 cm) in diameter occur in some stands. Tree basal area ranges from around 132 to 303 feet^2/acre (30.3 to 69.5 m^2/ha) in 6 sample stands.

A sparse to occasionally moderately closed layer of *Alnus tenuifolia* (*Alnus crispa* in some places) 12 to 20 feet (3.7 to 6.1 m) in height characterizes the forest understory. Alder canopy cover ranges from 15 to 70 percent. Most stands have a low and dwarf shrub layer below the alder layer. Important species in this layer include *Vaccinium uliginosum*, *V. vitis-idaea*, *Rosa acicularis*, *Salix* spp., *Ledum* spp., and *Empetrum nigrum*.

The herb layer in White spruce/thinleaf alder open forest generally is sparse to moderately open. Important herbs in most stands include *Equisetum* spp., *Calamagrostis canadensis*, *Arctagrostis latifolia*, and *Petasites frigidus*. The ground surface typically has an open to moderately closed layer of feathermoss. Herbaceous and woody litter cover most of the remainder of the ground surface.

Setting

Distribution and extent: Main Stem south of Canyon Rapids, lower North and South Branches, and the West Fork; to Sourdough; moderate extent
Elevation: 1,850 to 2,400 feet (564 to 732 m)
Landforms: level to occasionally moderately sloping high flood plains and low stream terraces; terrace height—generally from 4 to 10 feet (1.2 to 3.0 m)
Principal soils: Hogan; Klute, moderately wet; and Kluna, deep
Depth to seasonally high water table: 24 to 60 inches (61 to 152 cm) or more
Flooding frequency: occasional to rare
Occurrence of permafrost: absent in most stands; occasionally from 15 to 60 inches (38 to 152 cm) below the mineral surface

Successional Status

White spruce/thinleaf alder open forest is the end point of succession on flood plains. On stream terraces and other sites where permafrost is beginning to form in the soil, this type represents a preliminary stand condition leading to White spruce/ericaceous shrub woodland. With permafrost development, existing *Picea glauca* begin to die out and are replaced by slower growing *P. glauca* and *P. mariana*. *Alnus tenuifolia* and other species characteristic of flood plains succession begin to be replaced by ericaceous shrubs, feathermoss, and other species characteristic of upland spruce woodland.

Riparian-Wetland Status

Classification: riparian

White spruce/thinleaf alder open forest

***Picea glauca / Alnus tenuifolia* open forest**

PIGL/ALTE2

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T1	95	38	10	75	60
Populus balsamifera	T1	23	4	1	10	10
Picea glauca	T2	36	17	1	35	25
Picea glauca	T3	32	2	1	5	8
Alnus crispa	S2	18	19	10	25	18
Alnus tenuifolia	S2	86	35	1	70	55
Arctostaphylos rubra	S4	18	3	1	5	7
Betula glandulosa	S3	14	7	5	8	10
Empetrum nigrum	S4	77	10	1	65	28
Ledum spp.	S3	59	9	1	35	23
Potentilla fruticosa	S3	14	2	1	2	5
Ribes triste	S3	18	5	1	15	9
Rosa acicularis	S3	100	11	1	30	33
Salix arbusculoides	SM	14	4	1	10	7
Salix bebbiana	S2	14	13	3	30	13
Salix glauca	S2	23	6	2	10	11
Salix spp.	S3	59	8	1	35	22
Shepherdia canadensis	S3	27	3	1	5	8
Vaccinium uliginosum	S3	68	11	1	50	27
Vaccinium vitis-idaea	S4	86	9	2	45	28
Viburnum edule	S3	18	8	2	20	12
Artemisia tilesii	F	36	2	1	5	9
Aster sibiricus	F	23	4	1	10	9
Epilobium angustifolium	F	45	1	1	3	8
Equisetum spp.	F	100	20	1	60	45
Galium boreale	F	14	3	1	5	6
Geocaulon lividum	F	23	2	1	5	6
Hedysarum alpinum	F	45	4	1	30	13
Linnaea borealis	F	41	5	1	15	14
Mertensia paniculata	F	27	8	1	10	14
Petasites frigidus	F	50	4	1	15	14
Pyrola spp.	F	55	3	1	8	12
Rubus arcticus	F	27	1	1	2	5
Arctagrostis latifolia	G	68	5	1	20	18
Calamagrostis canadensis	G	41	6	1	15	16
Carex lugens	G	14	3	2	4	6
Carex spp.	G	18	3	1	5	7
Moss layer	M	100	60	10	95	78
Lichen layer	L	100	4	1	10	19
Bare soil	B	36	2	1	5	8
Litter and mulch	B	100	26	5	85	51
Woody litter (>1" dia.)	B	95	9	1	25	29

Salix spp. includes: SABA3, SAMO2, SAPL2

Number of stands = 22

ctsumtab

White spruce/willow open forest
***Picea glauca / Salix* spp. open forest**
PIGL/SALIX
(Figures 4, 7, 8, and 9; Plate 4—upper photo)

Description

White spruce/willow open forest consists primarily of open to moderately open stands of *Picea glauca*. In a few locations, stands of mixed *Picea glauca* and *Populus balsamifera* also occur. Tree canopy cover generally ranges from 35 to 60 percent. Woodland stands (10 to 25 percent canopy cover) occur in a few places, particularly along the upper Middle Fork and Main Stem. Trees are typically 35 to 65 feet (10.7 to 19.8 m) in height and 9 to 14 inches (23 to 36 cm) in diameter at breast height. Tree basal area ranges from 50 to 150 feet^2/acre (11.5 to 34.4 m^2/ha).

An open to closed layer of willow, mostly 3 to 5 feet (0.9 to 1.5 m) in height, characterizes the forest understory. Many stands also have a sparse to open layer of taller willow as much as 10 feet (3 m) in height. Total shrub cover ranges from 35 to 95 percent. Major low willows include *Salix planifolia*, *S. monticola*, and *S. barclayi*. The most important tall willow is *S. alaxensis*. Other low and dwarf shrubs common in many stands include various ericaceous shrubs, *Potentilla fruticosa*, and *Rosa acicularis*.

Herbs are usually abundant in White spruce/willow open forest. Intermixed with the low shrub layer are well-represented *Calamagrostis canadensis*, *Arctagrostis latifolia*, and *Epilobium angustifolia*. Important medium and low herbs include *Equisetum* spp., *Petasites frigidus*, and *Hedysarum alpinum*. Patches of moss are well-represented, otherwise the ground surface is covered with a nearly continuous layer of leaf litter and mulch.

Setting

Distribution and extent: Main Stem north of Canyon Rapids, the Middle Fork, and the upper reaches of the North and South Branches; extensive
Elevation: 2,350 to 2,700 feet (716 to 823 m)
Landforms: level to occasionally moderately sloping high flood plains along the river channel, and occasionally on alluvial fans; terrace height—mostly from 4 to 8 feet (1.2 to 2.4 m) above the channel; often on both lower and higher flood plain surfaces
Principal soils: various—primarily Klute; Kluna; and Hogan, cool
Depth to seasonally high water table: usually greater than 40 inches (greater than 102 cm)
Flooding frequency: occasional to rare

Successional Status

White spruce/willow open forest represents the late seral stage of succession on flood plains within the willow zone. It develops directly from Low willow/herb scrub.

Riparian-Wetland Status

Classification: riparian

White spruce/willow open forest
Picea glauca / Salix spp. open forest
PIGL/SALIX

Species Summary Table

Scientific name	Stratum	Con	Avg	Min	Max	Imp
Picea glauca	T1	74	29	7	65	46
Populus balsamifera	T1	15	16	5	30	15
Picea glauca	T2	53	27	3	60	38
Picea glauca	T3	59	6	1	25	19
Arctostaphylos rubra	S4	29	2	1	7	8
Betula glandulosa	SM	29	2	1	5	8
Empetrum nigrum	S4	59	2	1	5	11
Ledum spp.	S3	41	4	1	15	13
Potentilla fruticosa	S3	62	5	1	15	17
Rosa acicularis	S3	24	4	1	10	10
Salix alaxensis	S2	35	8	1	20	17
Salix spp.	SM	100	41	6	80	64
Shepherdia canadensis	S3	35	3	1	10	10
Vaccinium uliginosum	S3	85	9	1	35	27
Vaccinium vitis-idaea	S4	68	3	1	10	14
Aconitum delphiniifolium	F	56	1	1	2	6
Anemone spp.	F	18	1	1	3	4
Artemisia tilesii	F	35	1	1	5	7
Astragalus spp.	F	24	2	1	10	7
Cornus canadensis	F	35	4	1	10	12
Epilobium angustifolium	F	71	2	1	6	10
Equisetum spp.	F	85	31	1	85	52
Galium boreale	F	29	1	1	5	6
Hedysarum alpinum	F	50	4	1	35	14
Mertensia paniculata	F	62	2	1	15	12
Moneses uniflora	F	35	1	1	1	4
Parnassia palustris	F	21	1	1	1	3
Petasites frigidus	F	56	6	1	30	19
Polemonium acutiflorum	F	38	1	1	2	5
Pyrola spp.	F	38	1	1	5	7
Rubus arcticus	F	68	2	1	7	12
Rubus chamaemorus	F	15	1	1	2	4
Senecio spp.	F	26	1	1	1	4
Swertia perennis	F	18	1	1	3	4
Valeriana spp.	F	41	1	1	5	6
Arctagrostis latifolia	G	68	8	1	45	24
Calamagrostis canadensis	G	47	9	1	45	21
Carex aquatilis	G	15	7	1	30	10
Carex spp.	G	21	3	1	5	7
Festuca altaica	G	12	1	1	2	3
Poa spp.	G	21	3	1	15	8
Moss layer	M	100	51	1	85	71
Lichen layer	L	88	4	1	15	19
Bare soil	B	29	1	1	3	5
Litter and mulch	B	100	16	1	60	40
Surface water	B	12	5	1	10	7
Woody litter (>1" dia.)	B	56	5	1	15	17

Salix spp. includes: SABA3, SAMO2, SANO2, SAPL2
Number of stands = 34
ctsumtab

APPENDIX F—ECOLOGICAL SITES

An ecological site is a basic unit of ecological land classification and represents a type of land with a distinctive combination of potential natural plant communities, soils, landforms, hydrology, climate, and ecological properties and processes. Examples of ecological properties and processes include vegetation succession, nutrient cycling, and productivity. Ecological site classification is not oriented to any type of land or land use and is applicable to forest and rangeland, wetlands, and uplands. The relationship among climate, landforms, soils, and vegetation, and the ability to discern differences in the cumulative effect of these factors from one site to another, is the basis for ecological site classification. The ecological sites of the Gulkana River area are listed in Table 21.

The primary emphasis of ecological site classification is usually the vegetation on a site. Vegetation is considered to be an indicator of the integrated factors of the environment. Productivity, the response of the vegetation to various types of disturbances, and use and management of the vegetation are principal concerns to land owners and managers.

A secondary but equally important emphasis of site classification is landform and soil relationships. In general, the relationships between landforms and soils across the landscape are fairly predictable. Natural disturbances by wildfire, wind, and flooding, to name a few, result in considerable variation in vegetation. Landforms and soils provide a stable resource base by which ecological sites can be determined regardless of existing vegetative conditions. In addition, inferences can be made regarding site dynamics and stability, soil processes, and appropriate management systems based on landform and soil types.

While abrupt or distinct breaks between landforms, soils, and vegetation occasionally occur, more often than not the transition is gradual and indistinct. In addition, precipitation, temperature, and other climatic patterns, as well as microclimatic variables such as elevation, change gradually across the landscape. An ecological site classification, therefore, should be viewed as a landscape model. The boundaries between ecological sites are sometimes arbitrary and approximate. On the ground, the characteristics and properties within and between ecological sites are complex and variable, and usually overlap to some degree.

Ecological site classification provides a useful framework for correlating and compiling data and interpretations on multiple resources and landscape processes. Site classification is also a valuable framework for organizing, applying, and monitoring resource conservation systems for various land uses.

Potential Natural Plant Community.
By definition, an ecological site is characterized by a single potential natural plant community (PNC). The PNC is the assemblage of plant species that most nearly achieves a long-term steady state of productivity, structure, and composition on a site (*Tueller 1973*, cited by *National Research Council 1994*). The occurrence of a single potential plant community is based on the notion that over time, and in the absence of disturbances to the vegetation and changes in the site, succession (or the gradual and successive replacement of one plant community by another) eventually leads to a single plant community which best reflects the integrated factors of the environment. While this theory has been questioned on both theoretical and practical grounds (*National Research Council 1994*), the PNC provides a benchmark from which long and short term responses

of the vegetation to disturbances, and pathways and processes of succession, can be related.

Site Progression.

Site progression refers to gradual and progressive changes over time to the physical and environmental conditions of the site that result in a different PNC. In riparian systems and permafrost environments, there is a high potential for progressive changes due to geomorphic and soil forming processes and climatic influences and potentials. Vegetation succession on sites undergoing gradual site progression generally does not lead to a true PNC. Changes in the site are occurring concurrently with succession such that a "long-term steady state of productivity, structure, and composition" is never achieved.

Along rivers, a low flood plain is gradually elevated to the height of a stream terrace in response to flooding, channel migration and down-cutting, and the deposition of alluvium by flood waters. As the height of the land surface above the channel increases, flooding frequency and duration decrease and the depth to water table increases. Site changes of this nature usually occur gradually over the life cycle of valley formation.

Primary vegetation succession may occur concurrently with flood plain-stream terrace site progression. In Alaska, the sequence is typically from low stature herb and shrub communities on recently exposed alluvium to tall forest communities on stream terraces. The latest successional stage attainable on a specific hydrologically influenced surface is referred to as a riparian association (*Hansen 1989* cited by *Gebhardt et al. 1990*). For ecological sites in a riparian zone, the PNC is frequently a riparian association.

In permafrost environments, post-fire vegetation succession on most boreal forest sites is accompanied by a gradual increase in the abundance and thickness of the moss-organic layer on the soil surface. As the insulating capacity of the moss-organic layer increases, soil warming during summer is reduced and overall soil temperature decreases. Eventually, the permafrost table forms or rises within the soil profile and the soil drainage is restricted, often to the degree that a shallow water table is perched on the permafrost surface. Nutrient cycling and availability decreases markedly, as does site productivity, along with the changes in the soil environment. Productive hardwood and spruce forests gradually are replaced by unproductive mixed spruce woodland and scrub bogs.

The time frame and transition dynamics for site progression from a relatively warm, well drained, permafrost free condition to a cold, poorly drained, shallow permafrost condition are not well understood. For purposes of site classification, a reasonable hypothesis is that the duration of the well drained, permafrost free, productive condition persists for at least the life cycle of the initial spruce stand. Separate ecological sites are described for productive, well drained, permafrost free sites and poorly drained, shallow permafrost ones. The PNC is then defined as the latest successional stage observed on the site. On the permafrost free sites the PNC often is not a "long-term steady state of productivity, structure, and composition."

Site Retrogression.

Wildfire, a common recurring disturbance factor in the boreal forest, can interrupt or retard site progression or, as is often the case, cause a retrogression from a shallow permafrost, poorly drained condition to a well drained, permafrost free condition. In addition to destroying the existing dominant vegetation, wildfire consumes the insulating moss-organic mat to varying degrees and blackens the soil surface, which leads to significant soil warming during summer. On sites with shallow permafrost, this results in thawing and an increase in the depth to permafrost, improved soil drainage, enhanced nutrient cycling and availability, and a dramatic increase in site productivity. Depending on initial site and vegetative conditions and the severity of the fire, site retrogression of this degree can occur within a few years following burning.

Not all wildfire, however, leads to site retrogression. Vegetation on permafrost free sites is equally susceptible to wildfire. Often, fire destroys the existing vegetation before the later point of site progression is reached. In this situation, wildfire results in renewed secondary succession of the vegetation and nutrient release to the ground surface, but has little effect on other soil and site properties.

In addition to identifying the latest successional stage as the PNC, ecological site classification provides a framework for recognizing and describing progression-retrogression dynamics and relationships.

Soil-Site Correlation

An ecological site consists of a group of one or more soils that have similar vegetative and ecological potentials and processes. While a number of different soils may be grouped together into an ecological site, any individual soil may be included in only a single site. To establish soil-site relationships and maintain the one-to-one correlation, vegetative characteristics and ecological patterns and processes are used in conjunction with soil characteristics and other criteria specified in "Soil Taxonomy" and "Keys to Soil Taxonomy" (*Soil Survey Staff 1975; 1996b*) to develop the soil classification.

Because of the one-to-one correlation between a soil and an ecological site, the ecological site can be determined by knowing the soil. This is particularly useful when the vegetation is not a definitive indicator of the site—for example, when vegetation has been altered by disturbance or management or when vegetation on two sites is similar in composition and structure. The one-to-one correlation means that an ecological site map can be derived from the soils map. The soil components correlated to the Gulkana River area ecological sites are listed in Table 22.

Ecological Site Descriptions

172Xy100AK—Loamy flood plains

Vegetation Name

Balsam poplar-white spruce/thinleaf alder open forest

Landtype Associations

135A1.V3—Southcentral Loamy Flood Plains and Stream Terraces
135A1.V4—Southern Loamy Flood Plains and Stream Terraces

In the Gulkana River area, this site occurs along the Main Stem south of canyon rapids, the lower North and South Branches, and the West Fork; to Sourdough.

Soils Grouped Into This Site

Dackey; Klute, moderately wet; Kluna, frequently flooded; and Kluna, deep

Description of the Site

Landscape:
This site consists of level to gently sloping flood plains formed in stratified sandy and silty alluvium over very gravelly and cobbly alluvium. Terrace height above the mean

summer channel level is typically 2 to 8 feet (0.6 to 1.2 m), and the site is occasionally to frequently flooded. Elevation is generally below about 2,400 feet (732 m).

Soils:

Soils on this site have a mantle of stratified sandy and silty alluvium 10 to 60 inches (25 to 152 cm) thick over very gravelly alluvium. Most have a thin, discontinuous surface organic layer. Soils are somewhat poorly drained. Aquic conditions include a seasonally high water table that ranges from 18 to more than 72 inches (46 to more than 183 cm), and redoximorphic features, including redox depletions and/or a reduced matrix, are present at depths of 18 to more than 60 inches (46 to more than 152 cm) below the soil surface.

Vegetation:

Balsam poplar-white spruce/thinleaf alder open forest is the correlated PNC on this site. This PNC is best characterized as a riparian association, which develops under a regime of intermittent fluvial disturbance.

Site Progression-Retrogression:

This site spans the range of flood plain-stream terrace development from frequently flooded, low flood plains to occasionally flooded, mid flood plains. Through a combination of channel migration, down-cutting, and deposition of alluvium, the flood plain surface is gradually elevated above the level of the river channel. As the terrace level is elevated, there is a progressive increase in the thickness of loamy alluvium over underlying sandy skeletal alluvium and build up of organic material on the soil surface, and an increase in the depth to the water table. The lowest flood plain positions usually support the earlier seral stages of vegetation succession. By the time the surface is elevated to the level of mid flood plains, later seral stages have developed on the site. Seral stages commonly found on this site, in approximate order of succession, include Tall feltleaf willow/thinleaf alder scrub, Tall thinleaf alder/willow scrub and Tall thinleaf alder-feltleaf willow scrub, Tall thinleaf alder scrub, and Balsam poplar/thinleaf alder open forest.

Over time, as the elevation of the flood plain surface is raised further, periodic flooding and new accretions of alluvium, for the most part, cease. This transition corresponds with site progression to ecological sites 172Xy102AK—Loamy high flood plains, frozen and 172Xy103AK—Stream terraces, frozen. Permafrost is frequently within the soil profile on high flood plains and stream terraces.

172Xy101AK—Loamy high flood plains

Vegetation Name

White spruce/willow open forest

Landtype Associations

135A1.V2—Northcentral Loamy Flood Plains and Stream Terraces
135A1.V5—Lower Middle Fork Flood Plains and Stream Terraces
135A1.V7—South Branch Deep Loamy Flood Plains and Stream Terraces

In the Gulkana River area, this site is common along the Middle Fork, the Main Stem north of canyon rapids, and the upper reaches of the North and South Branches. It also occurs along major side streams and drainages above the river corridor.

Soils Grouped Into This Site

Klute; Klute, occasionally flooded; Kluna; Tangoe, occasionally flooded; and Hogan, cool

Description of the Site

Landscape:

This site consists of level to moderately sloping high flood plains formed in stratified sandy and silty alluvium over very gravelly and cobbly alluvium. Terrace height above the mean summer channel level is typically 3 to 10 feet (0.9 to 3.0 m), and the site is occasionally to rarely flooded. Elevation is generally 2,300 to 2,600 feet (701 to 792 m).

Soils:

The weakly developed soils on this site typically have a mantle of stratified sandy and silty alluvium 12 to over 60 inches (30 to over 152 cm) thick over very gravelly and cobbly alluvium. Rarely, the sandy and silty layer is less than 12 inches (less than 30 cm)—Tangoe soils. Depth to a seasonally high water table ranges from 40 to over 60 inches (102 to over 152 cm) and the soils are moderately well to well drained. Aquic conditions, including redox depletions and/or a reduced matrix, occur on occasions below 40 inches (below 102 cm). On some of the older, higher flood plain positions, permafrost occurs between 20 to more than 60 inches (51 to more than 152 cm)—Hogan, cool soils. Permafrost soils usually do not have a perched water table on the permafrost surface.

Vegetation:

White spruce/willow open forest is the correlated PNC on this site. This PNC is best characterized as a riparian plant association and may only exist during the life span of the initial generation of trees.

Site Progression-Retrogression:

This site appears to be an intermediate stage of flood plain-stream terrace development. As channel migration, down-cutting, and deposition of alluvium gradually increase the elevation of the flood plain above the river channel, this site develops from ecological sites 172Xy200AK—Gravelly flood plains, moderately wet and 172Xy201AK—Loamy flood plains, moderately wet. In some places, a short, steep escarpment separates adjacent flood plain levels. Elsewhere, on islands and in areas of high channel sinuosity, a gradual increase in terrace height away from the channel is evident. As the level of the flood plain increases, the low willow scrub vegetation on the lower flood plains gradually is replaced by White spruce/willow open forest on the higher positions.

On the highest flood plain positions, flooding is rare. Without the periodic deposition of new alluvium associated with flooding, ericaceous shrubs gradually replace the willow understory, and the organic mat on the soil surface accumulates and thickens. Continued development and thickening of the organic mat results in a gradual decrease in soil temperatures and reduction in nutrient availability and cycling. Over the life span of the initial *Picea glauca* stand, permafrost develops within the soil profile and site productivity apparently decreases markedly. Continued vegetation succession and progressive changes in site and soil properties eventually lead to ecological sites 172Xy104AK—Stream terraces and 172Xy103AK—Stream terraces, frozen. The White spruce/ericaceous shrub open forest vegetation type usually indicates the transition. This cover type consists of a decadent stand of tall, large diameter *Picea glauca*, many of which have already died and are beginning to fall over. Below the deteriorating overstory is a younger, smaller stand of mixed *Picea glauca* and *Picea mariana*. Trees within this layer often appear poorly formed, slow growing, and have yellowish green foliage—characteristics of cold, low productivity sites. By this point, ericaceous shrubs are prominent in the understory.

172Xy102AK—Loamy high flood plains, frozen

Vegetation Name

White spruce/thinleaf alder open forest

Landtype Associations

135A1.V3—Southcentral Loamy Flood Plains and Stream Terraces
135A1.V4—Southern Loamy Flood Plains and Stream Terraces

In the Gulkana River area, this site occurs along the Main Stem south of canyon rapids and along the lower North and South Branches and the West Fork; to Sourdough.

Soils Grouped Into This Site

Hogan

Description of the Site

Landscape:

This site consists of level to moderately sloping, high flood plains formed in stratified loamy alluvium over very gravelly alluvium. Terrace height above the mean summer channel level typically ranges from 5 to 10 feet (1.5 to 3.0 m) and the site is rarely flooded. The surface organic mat is moderately thick and permafrost is usually present within the soil profile. Elevation is generally below about 2,400 feet (732 m).

Soils:

The weakly developed soils on this site typically have a mantle of stratified sandy and silty alluvium 12 to more than 60 inches (30 to more than 152 cm) thick over very gravelly alluvium. The organic mat ranges from 2 to 9 inches (5 to 23 cm) thick, and permafrost is usually present at a depth of 14 to 37 inches (36 to 94 cm). Except for a thin saturated zone in spring and early summer, no perched water table occurs at the permafrost contact and the soils are well drained.

Vegetation:

White spruce/thinleaf alder open forest is the correlated PNC on this site.

Site Progression-Retrogression:

This site appears to be an intermediate stage of flood plain-stream terrace development. As additional accretions of alluvium, channel migration, down-cutting, or a combination of these processes increase the height of the terrace surface and decrease the frequency and duration of flooding, this site develops from ecological site 172Xy100AK—Loamy flood plains. As the height of the flood plain above the channel increases, the earlier successional stages are gradually replaced by White spruce/thinleaf alder open forest.

Eventually, periodic flooding all but ceases because of increased terrace height. Without the periodic deposition of new alluvium associated with flooding, the alder understory is gradually replaced by ericaceous shrubs and the organic layer on the surface thickens. Continued development and thickening of the organic mat results in a decrease in soil temperatures and a reduction in nutrient availability and cycling. Eventually, permafrost develops within the soil profile and site productivity apparently decreases markedly. Continued vegetation succession and progressive changes in site and soil conditions lead to ecological site 172Xy103AK—Stream terraces, frozen or 172Xy104AK—Stream terraces. The White spruce/ericaceous shrub open forest cover

type usually indicates the transition. This type develops as growing conditions on the site continue to deteriorate and the original *Picea glauca* forest on the flood plains begins to die off and be replaced by less productive white and black spruce characteristic of stream terraces. Tall *Picea glauca* snags and large diameter downfall are frequent in these stands. Ericaceous shrubs, which are well adapted to the nutrient poor sites, begin to increase in abundance and dominate the understory.

172Xy103AK—Stream terraces, frozen

Vegetation Name

Spruce/spruce muskeg sedge open forest

Landtype Associations

135A1.V2—Northcentral Loamy Flood Plains and Stream Terraces
135A1.V3—Southcentral Loamy Flood Plains and Stream Terraces
135A1.V4—Southern Loamy Flood Plains and Stream Terraces
135A1.V5—Lower Middle Fork Flood Plains and Stream Terraces
135A1.V7—South Branch Deep Loamy Flood Plains and Stream Terraces

In the Gulkana River area, this site occurs along all reaches of the river except for the upper Middle Fork.

Soils Grouped Into This Site

Kuslinad

Description of the Site

Landscape:
This site consists of level to moderately sloping, poorly drained stream terraces with shallow to very shallow permafrost. Elevation is generally 1,850 to 2,600 feet (564 to 792 m).

Soils:
Soils on this site are very poorly or poorly drained and very shallow or shallow to permafrost. They typically have an organic mat 8 to 16 inches (20 to 41 cm) thick over stratified sandy and silty alluvium. Depth to permafrost ranges from 4 to 32 inches (10 to 81 cm) below the mineral soil surface. A water table is perched on the impermeable permafrost; depth to the top of the water table ranges from within the organic mat to about 12 inches (15 cm) below the mineral surface. A reduced matrix or common reduction mottles are present above the permafrost in most profiles.

Vegetation:
Spruce/spruce muskeg sedge open forest is the correlated PNC on this site. Many areas support late seral Spruce/shrub birch woodland.

Site Progression-Retrogression:
This site represents the end point of flood plain-stream terrace development, the point at which the terrace has been elevated above the level of flooding and alluvium deposition. Vegetation succession also has progressed to the point where the soil has a thick, insulating moss-organic layer on the surface and permafrost has risen to within the soil profile. Preceding stages of this site progression include ecological sites 172Xy101AK—Loamy high flood plains; 172Xy102AK—Loamy high flood plains, frozen;

and 172Xy104AK—Stream terraces. Disturbance by wildfire, which destroys the existing vegetation and moss-organic layer, blackens the soil surface, and causes the permafrost layer to drop to below the soil profile, may result in site retrogression toward ecological site 172Xy104AK—Stream terraces.

172Xy104AK—Stream terraces

Vegetation Name

Spruce/shrub birch woodland

Landtype Associations

135A1.V3—Southcentral Loamy Flood Plains and Stream Terraces
135A1.V5—Lower Middle Fork Flood Plains and Stream Terraces

In the Gulkana River area, this site occurs primarily along the lower Middle Fork, in the canyon of the Main Stem, and along the North Branch, lower South Branch, and upper West Fork.

Soils Grouped Into This Site

Ganhona, Kusdry, Maclaren, and Sinona

Description of the Site

Landscape:

This site consists of level to gently sloping stream terraces and nearly level to moderately steep dissected stream terraces formed in a thin to moderately thick layer of stratified sandy and silty alluvium over very gravelly alluvium. Permafrost is generally absent on this site. Elevation is from 1,950 to 2,600 feet (594 to 792 m).

Soils:

The moderately well developed soils on this site typically have a mantle of stratified sandy and silty alluvium 2 to 31 inches (5 to 79 cm) thick over very gravelly alluvium. The surface organic mat ranges from 1 to 6 inches (2.5 to 15 cm) thick. Depth to a seasonally high water table is more than 6 feet (more than 1.8 m) and the soils are well drained.

Vegetation:

Spruce/shrub birch woodland is the correlated PNC on this site. In some places, this site supports Spruce/lichen woodland, which may be a persistent and relatively stable plant community on soils that are shallow to sandy and gravelly alluvium and on drier microsites, such as shoulders and crests of low ridges and other convex slopes.

Site Progression-Retrogression:

In many places, this site represents a retrogressive stage of ecological site 172Xy103AK—Loamy stream terraces, frozen, in which wildfire has indirectly caused the permafrost to thaw and retreat deep into the soil or possibly disappear completely. Elsewhere, particularly on dissected terrace remnants with only a thin surface layer of finer textured alluvium, the potential for permafrost probably is limited, and this site appears to represents the end point of site progression on flood plains and stream terraces. This portion of the site is also where Spruce/lichen woodland is usually found.

172Xy105AK—Terraces, wet

Vegetation Name

Black spruce/closed sheath cottongrass woodland

Landtype Associations

135A1.V3—Southcentral Loamy Flood Plains and Stream Terraces
135A1.V4—Southern Loamy Flood Plains and Stream Terraces
135A1.V7—South Branch Deep Loamy Flood Plains and Stream Terraces
135A2.U1—Loamy Glaciolacustrine Uplands
135A2.U2—Clayey Glaciolacustrine Uplands
135A2.U3—Ruptic Glaciolacustrine Uplands
135A2.U4—Loamy Depressional Glaciolacustrine Uplands

In the Gulkana River area, this site is wide spread along the entire length of the West Fork and along the lower reaches of the Main Stem.

Soils Grouped Into This Site

Klasi ,very wet; Kuslinad, very wet; Mendna, very wet; Haggard; Pergelic Cryohemists; and Cryaquepts, very wet

Description of the Site

Landscape:

This site occurs on nearly level and broadly concave stream terraces and lacustrine terraces, and on toeslopes on lacustrine terrace escarpments. The surface is mantled in moderately thick to thick organic deposits. Surface microtopography is strongly hummocky. Most areas of this site appear to receive a surplus of water as surface run-in and ground water discharge from the adjacent uplands. Ponding or wet conditions near the surface during much of the summer appear to be the most important characteristic of this site.

Soils:

The soils on this site formed in moderately thick to thick organic materials over loamy alluvium and lacustrine deposits. The surface organic mat typically ranges from 7 to 34 inches (18 to 86 cm) thick in the inter-hummock depressions and from 16 to over 40 inches (41 to 102 cm) within the hummocks. The seasonally high water table ranges from as much as 10 inches (25 cm) of ponding to a depth of 10 inches (25 cm) below the surface, and the soils are very poorly drained. Depth to permafrost ranges from within the organic material to 38 inches (97 cm) below the mineral surface. Aquic conditions, including reduced matrices and saturation, are present within 10 inches (25 cm) of the surface.

Vegetation:

Black spruce/closed sheath cottongrass woodland is the correlated PNC on this site. The characteristic feature of this vegetation is the closely-spaced turf hummocks or tussocks formed by the *Eriophorum brachyantherum*.

Site Progression-Retrogression:

This site is not known to represent a progressive stage of similar or adjoining sites; however, areas with site, soil, and vegetative properties transitional to ecological sites 172Xy103AK—Stream terraces, frozen and 172Xy107AK—Glaciolacustrine uplands, frozen are common.

Because the soil surface is mantled with a moderately thick to thick layer of organic material throughout this site, dramatic changes in the characteristics of this site might be expected following severe wildfire during extremely dry years. The surface organic material could become highly susceptible to burning if there was a significant drop in the level of the water table during prolonged dry conditions. Ground fires under such conditions could burn into the organic mat to a considerable degree and conceivably result in a lowering of the base elevation of the surface. Later, when the water table once again rose to more normal levels, conditions may be suitable for the development of Sedge wet meadow vegetation and site characteristics more typical of ecological site 172Xy501AK—Wet depressions. Whether changes of this magnitude as a result of wildfire have in fact ever occurred is not known.

172Xy106AK—Glaciolacustrine uplands

Vegetation Name

Spruce/shrub birch woodland

Landtype Associations

135A2.U1—Loamy Glaciolacustrine Uplands
135A2.U2—Clayey Glaciolacustrine Uplands

This site occurs throughout the uplands in the Gulkana River area. It occurs intermittently on the same landscapes with other ecological sites with shallow permafrost.

Soils Grouped Into This Site

Chelina, Gadona, and Telay

Description of the Site

Landscape:
This site occurs on lacustrine terraces, till plains, and hills formed in loamy and clayey lacustrine deposits and gravelly and loamy glacial till. Permafrost is generally absent. Slopes in most places range from 0 to 20 percent. Elevation is from 1,900 to 2,800 feet (579 to 853 m).

Soils:
The poorly developed soils on this site formed in gravelly glacial till and fine-grained lacustrine deposits. The organic mat is generally less than 6 inches (less than 15 cm) thick. Some soils have a surface mantle of silty eolian material up to 8 inches (20 cm) thick. In most places there is no water table present within the soil profile and the soils are well drained.

Vegetation:
Spruce/shrub birch woodland is the correlated PNC on this site. Seral Low shrub birch scrub and Spruce/lichen woodland occur in many places.

Site Progression-Retrogression:
Snags and charred downfall; a thin, weakly developed moss-organic mat; and other evidence of past wildfire are common in most stands, suggesting that this site is subject to recurring wildfires. Additional evidence includes scattered spruce trees and clumps of trees in stands of seral Low shrub birch scrub. In places, this site occurs side-by-side on the same landform with ecological site 172Xy107AK—Glaciolacustrine uplands, frozen,

suggesting that 172Xy106AK—Glaciolacustrine uplands is a retrogressive stage of 172Xy107AK—Glaciolacustrine uplands, frozen that develops following wildfire. Prominent fire lines are evident between areas of the two sites.

Absence of fire for an extended period of time in 172Xy106AK—Glaciolacustrine uplands would allow the moss-organic layer to thicken and insulate the soils, favoring the development of permafrost and restricted soil drainage. Continued development of the moss-organic layer, and soil permafrost and vegetation succession, would lead to site progression toward ecological site 172Xy107AK—Glaciolacustrine uplands, frozen.

172Xy107AK—Glaciolacustrine uplands, frozen

Vegetation Name

Spruce/spruce muskeg sedge open forest

Landtype Associations

135A2.U1—Loamy Glaciolacustrine Uplands
135A2.U2—Clayey Glaciolacustrine Uplands
135A2.U3—Ruptic Glaciolacustrine Uplands

This site occurs throughout the uplands in the Gulkana River area and, intermittently, on the same landscapes with other ecological sites that lack shallow permafrost.

Soils Grouped Into This Site

Klasi, Mankomen, Mendna, and Cryaquepts

Description of the Site

Landscape:

This site occurs on lacustrine terraces, till plains, and hills formed in loamy and clayey lacustrine deposits and gravelly and loamy glacial till. The soil surface has a moderately thick organic mat, and permafrost is generally present within 60 inches (152 cm) of the mineral surface. Slope ranges from 0 to 25 percent but is generally less than 10 percent. Elevation is from 1,900 to 2,800 feet (579 to 853 m).

Soils:

The poorly developed soils on this site formed in gravelly glacial till and fine-grained lacustrine deposits. Some soils have mantles of silty eolian material up to 2 inches thick. In the absence of wildfire, an organic mat 8 to 16 inches (20 to 41 cm) thick develops on the soil surface, and in most places permafrost is present above 60 inches (152 cm). A water table is usually perched on the permafrost, and the soils are poorly to very poorly drained.

Vegetation:

Spruce/spruce muskeg sedge open forest is the correlated PNC on this site. Late seral Spruce/shrub birch woodland occurs in many places.

Site Progression-Retrogression:

Wildfire on this site could be expected to impact both the structure and composition of the vegetation and the characteristics of the site. Moderate to severe burns, in which the moss-organic layer on the soil surface is blackened and partially to completely destroyed, would favor a rapid and long-term warming of the soil profile. Over a relatively short

period, the permafrost level would drop and soil drainage should improve. In this situation, the site would be expected to retrogress to ecological site 172Xy106AK—Glaciolacustrine uplands.

172Xy108AK—Gravelly and sandy terraces

Vegetation Name

Spruce/lichen woodland

Landtype Associations

135A1.V6—Gravelly and Loamy Alluvial Fans and Fan Terraces
135A2.U1—Loamy Glaciolacustrine Uplands

In the Gulkana River area, this site occurs as scattered, relatively small areas of strandline deposits throughout most of the uplands, with the exception of the South Branch. It occurs on high terraces immediately above the river corridor and on nearby lacustrine terraces, as well as on fan terraces along the Middle Fork.

Soils Grouped Into This Site

Chistna, Clarena, and Pippod

Description of the Site

Landscape:
This site consists of isolated strandline deposits on glaciolacustrine uplands and alluvial fans within the river corridor. The landscape is formed in deep, sandy and gravelly materials, often overlain by a thin mantle of eolian silts. Slopes generally range from 0 to about 12 percent. Occasional short slopes up to 25 percent also occur. Elevation is from 1,900 to 2,700 feet (579 to 823 m).

Soils:
The moderately well developed soils on this site have a thin mantle of silty eolian material 1 to 8 inches (2.5 to 20 cm) thick over very gravelly or sandy glaciofluvial materials. Most have a thin organic mat up to about 3 inches (8 cm) thick. Permeability is rapid and the soils are somewhat excessively drained. Depth to a seasonally high water table is greater than 6 feet (greater than 1.8 m). Because of the coarse textures and low water holding capacity, these soils are relatively dry throughout the growing season.

Vegetation:
Spruce/lichen woodland is the correlated PNC on this site. In many places, this PNC probably is best described as a fire climax (dependent on being burned at rather regular intervals). Microsites that have remained unburned for an extended period, and cooler and moister microsites such as northerly aspects and concave slopes, often support Spruce/shrub birch woodland. Early seral Low shrub birch/lichen scrub and mid to late seral Quaking aspen forest and Quaking aspen-white spruce forest occur in many places.

Site Progression-Retrogression:
No progressive or retrogressive relationships or conditions are known to occur on this site. Because soils on this site are coarse textured with low water holding capacity, the potential for development of a thick, insulating moss-organic layer on the soil surface and permafrost within the soil profile probably is limited.

172Xy109AK—Mountain slopes, shallow

Vegetation Name

Spruce/shrub birch woodland

Landtype Associations

135A4.M1—Northern Low Mountains

In the Gulkana River area, this site is of minor occurrence in a few scattered locations above the Middle Fork and upper Main Stem.

Soils Grouped Into This Site

Cobblank

Description of the Site

Landscape:
This site occurs on bedrock cored mountain slopes and summits below about 2,900 feet (884 m) elevation. Most areas have been smeared with a thin mantle of loamy till and lacustrine deposits. Slopes range from 8 to 35 percent.

Soils:
The moderately well developed soils on this site have a mantle of silty eolian material 1 to 4 inches (2 to 10 cm) thick over very gravelly and very cobbly loamy till and loamy lacustrine material. Bedrock is at depths of 10 to 20 inches (25 to 51 cm) in most places. The soils are well drained.

Vegetation:
Spruce/shrub birch scrub is the correlated PNC on this site. Seral Low shrub birch scrub is present in most places.

Site Progression-Retrogression:
No progressive or retrogressive relationships or conditions are known to occur on this site.

172Xy110AK—Glaciolacustrine uplands, ruptic

Vegetation Name

Spruce/shrub birch woodland

Landtype Associations

135A2.U3—Ruptic Glaciolacustrine Uplands

In the Gulkana River area, this site is of limited extent and found only on lacustrine terraces above the upper South Branch.

Soils Grouped Into This Site

Swillna and Swillna, thin surface

Description of the Site

Landscape:

This site occurs on glaciolacustrine terraces formed in clayey lacustrine deposits. This site is characterized by surface microtopography consisting of a complex of sparsely vegetated, ice-cored frost boils and intervening swales and troughs. In most places, the frost boils are about 24 inches (61 cm) high and 9 feet (3 m) across. The landscape is underlain by permafrost, including ice-rich soil material, ice lenses, vein ice, and probably occasional ice wedges. Slopes generally range from 0 to 8 percent. Elevation is 2,300 to 2,500 feet (701 to 762 m).

Soils:

Soils on this site formed in clayey lacustrine deposits. On frost boils, the soil is sparsely vegetated, the organic mat ranges from 0 to 4 inches (0 to 10 cm) thick, and bare mineral soil is exposed across much of the surface. Soils on frost boils are moderately deep over permafrost and somewhat poorly drained. In inter-mound swales and troughs, the soils have an organic mat 8 to 14 inches (20 to 36 cm) thick, permafrost is shallow to moderately deep, and the soils are very poorly drained. Soil horizons are mixed by cryoturbation; buried, distorted, and fractured horizons are present in most places. Redoximorphic features indicative of wetness are evident in troughs but less evident in boils.

Vegetation:

Spruce/shrub birch woodland is the correlated PNC on this site, although dramatic differences in understory composition are evident on the frost boils versus the inter-mound swales and troughs. On frost boils, sparse shrubs, herbs, and patches of moss with extensive bare soil characterize the understory in mature stands. In the swales and troughs, the understory generally has common to abundant low shrubs and a luxuriant moss layer. In many places, the vegetation is similar to the understory of Black spruce/closed sheath cottongrass woodland.

Site Progression-Retrogression:

No progressive or retrogressive relationships or conditions are known to occur on this site.

172Xy111AK—Peat mounds

Vegetation Name

Spruce/shrub birch woodland

Landtype Associations

135A1.V5—Lower Middle Fork Flood Plains and Stream Terraces
135A2.U3—Ruptic Glaciolacustrine Uplands
135A2.U4—Loamy Depressional Glaciolacustrine Uplands

In the Gulkana River area, this site occurs in scattered locations, usually of small extent, on lacustrine terraces above the North Branch, West Fork, and Main Stem. This site occasionally occurs on stream terraces near the confluence of the Middle Fork and the Main Stem.

Soils Grouped Into This Site

Pergelic Cryohemists, dry

Description of the Site

Landscape:

This site occurs on frozen peat mounds (also called palsen) adjacent to ponds, lakes, and wet meadows on glaciolacustrine uplands and occasionally on stream terraces. The rounded to flat-topped mounds and ridges are elevated 2 to 30 feet (0.6 to 9.1 m) above the adjacent landscape. Frozen peat, often with thin ice lenses and large ice masses, usually is encountered within 40 inches (102 cm) of the surface, and most mounds have a core of massive ice at varying depths. Slopes range from 0 to 100 percent. Elevation is 1,900 to 2,500 feet (579 to 762 m).

Soils:

The soils on this site formed in slightly to moderately decomposed organic materials derived from *Sphagnum* spp., *Carex* spp., and ericaceous shrubs. Mineral lenses and horizons are present in some soils. In most places, the soils are shallow or moderately deep over permafrost. Most soils do not have a water table perched on the permafrost, and are well drained.

Vegetation:

Spruce/shrub birch woodland is the correlated PNC on this site. In many places, particularly on lower relief mounds, cover of stunted trees is less than 10 percent and Low shrub birch scrub may be the potential or, at the least, a persistent late seral stage.

Site Progression-Retrogression:

In most places, this site occurs in complex with ecological site 172Xy501AK—Wet depressions and sedge wet meadow vegetation. In many situations, the peat mounds are believed to have developed from the wet meadows. Initial stages of peat mound development probably are due to an unusually thin cover of snow (*Williams and Smith 1989*), which allows for deep frost penetration and frost heaving. Heaving ground often forms discrete, irregularly spaced bumps several inches in height. The drier peat near the surface of these slightly elevated areas increases the overall insulating qualities of the peat, maintaining frozen soil conditions throughout the summer and promoting the formation of ice crystals and masses. Abundant water from the adjacent wet meadows and ponds feeds the developing ice core of the mound. Free water in contact with the frozen core freezes, increasing the size and extent of the frozen core. Peat mounds are usually formed as the core of massive ice enlarges and pushes the surface up and above the surrounding landscape.

All stages of mound development can be observed in the Gulkana River area, from low, small diameter mounds dispersed throughout areas of wet meadow to high, steep sided mounds elevated as much as 30 feet (9.1 m) above adjacent wet sedge meadows and lakes.

The impact of wildfire on ecological site 172Xy111AK—Peat mounds depends to a large degree on its effects on the thermal balance of the mound and is likely to range from slight to devastating. Following a very light burn, vegetation succession should lead directly and rather quickly to Low shrub birch scrub vegetation and the mound would likely remain otherwise undisturbed. Moderate to severe burning, on the other hand, could lead to complete destruction of the mound. Blackening and partial combustion of the surface organic layers by fire could dramatically effect the insulating capacity of the organic surface and disrupt the thermal balance of the mound. During particularly dry conditions, the fire could possibly consume the organic material to a considerable depth. The blackened surface, in combination with the loss of the surface vegetation, would result in a significant increase in the amount of solar energy hitting and being absorbed at the mound surface. In the most extreme case, the ice core would melt sufficiently for the peat mound

to collapse. In this situation, a portion, if not all, of the mound would likely retrogress to ecological site 172Xy501AK—Wet depressions or to a pond.

172Xy200AK—Gravelly flood plains, moderately wet

Vegetation Name

Low willow/herb scrub

Landtype Associations

135A1.V1—Gravelly and Loamy Flood Plains

In the Gulkana River area, this site primarily occurs along the Middle Fork, along the Main Stem from the outlet of Paxson Lake to the Middle Fork confluence, and along Keg Creek on the North Branch. It also occurs in small, isolated areas throughout the remainder of the River corridor.

Soils Grouped Into This Site

Tangoe and Tangoe, wet, occasionally flooded

Description of the Site

Landscape:

This site consists of level to gently sloping flood plains formed in a very thin mantle of stratified alluvium over gravelly and cobbly alluvium along clear water rivers and streams. Terrace height above the mean summer channel level is typically 3 feet (0.6 m) or less and the site is frequently to occasionally flooded. In some places, the site is cut with shallow, narrow ephemeral and perennial channels. Elevation is generally from 2,500 to 2,850 feet (762 to 869 m).

Soils:

The weakly developed soils on this site typically have a mantle of stratified sandy and silty alluvium less than 8 inches (less than 20 cm) thick over very gravelly and cobbly alluvium. The surface organic mat ranges from 0 to 1 inch (0 to 2.5 cm) thick. Depth to a seasonally high water table ranges from 12 to 40 inches (30 to 102 cm) and the soils are somewhat poorly drained. During periods of peak snowmelt and runoff, the water table is at or near the soil surface. On the lowest flood plain positions, the water table may remain near the surface most of the growing season.

Vegetation:

Low willow/herb scrub is the correlated PNC on this site. In most places, this PNC is best characterized as a riparian association, which develops and persists under a regime of intermittent fluvial disturbance. In the Gulkana River area, the upper elevational limit of this site, which corresponds with the upper elevational limit of the survey area within the river corridor, may be above the limit of tree growth. In this situation, the PNC probably represents the long term vegetative potential.

Site Progression-Retrogression:

In most places, this site represents an early stage of flood plain-stream terrace development along moderate to steep gradient stream channels. Down-cutting by the channel and continued surface deposition of alluvium will, over time, raise the terrace height, increase the thickness of the fine textured alluvium on the soil surface, and cause other changes in site and soil properties. Site progression appears to lead to

172Xy101AK—Loamy high flood plains. At higher elevations, where the potential for trees is probably limited to occasional scattered trees and clumps of trees on favorable microsites, site progression appears to lead to 172Xy201AK—Loamy flood plains, moderately wet.

172Xy201AK—Loamy flood plains, moderately wet

Vegetation Name

Low willow/herb scrub

Landtype Associations

135A1.V2—Northcentral Loamy Flood Plains and Stream Terraces
135A1.V5—Lower Middle Fork Flood Plains and Stream Terraces
135A1.V7—South Branch Deep Loamy Flood Plains and Stream Terraces

In the Gulkana River area, this site occurs along the Middle Fork, the upper North and South Branches, and the Main Stem from the confluence of the Middle Fork to canyon rapids. It also occurs in small, scattered locations along the other reaches of the river.

Soils Grouped Into This Site

Dackey, cool; Ogtna; Sankluna; and Swedna

Description of the Site

Landscape:

This site consists of level to occasionally strongly sloping flood plains formed in stratified silty alluvium over very gravelly and cobbly alluvium along clear water rivers and streams. The site occurs on point bars and outer margins of meanders. Terrace height above the mean summer channel level is typically from 2 to 8 feet (0.6 to 2.4 m) and the site is frequently to occasionally flooded. Elevation is generally from 2,350 to 2,900 feet (716 to 884 m).

Soils:

The weakly developed soils on this site typically have a mantle of stratified sandy and silty alluvium 10 to 37 inches (25 to 94 cm) thick over very gravelly and cobbly alluvium. Depth to a seasonally high water table ranges from 14 to 48 inches (36 to 122 cm) and the soils are poorly to moderately well drained. During most years, the water table is at or near the surface during periods of snowmelt and peak runoff. Aquic conditions, including redox depletions and/or a reduced matrix, are present within 20 inches (51 cm) of the soil surface.

Vegetation:

The correlated PNC on this site is low willow scrub. Within the Gulkana River area, two vegetation type are included in the PNC—Low willow/herb scrub and Low willow/herb2 scrub. These vegetation types are best characterized as riparian associations, which persist under a regime of intermittent fluvial disturbance. The upper elevational limit of this site in the Gulkana River area may be above tree line. In this situation, the PNC probably represents the long term vegetative potential.

Site Progression-Retrogression:

This site represents an early stage of flood plain-stream terrace development along low to moderate gradient stream channels. Down-cutting and deposition of alluvium will, over

time, raise the terrace height, increase the thickness of the fine textured alluvium on the soil surface, and cause other changes in site and soil properties. Site progression appears to lead to 172Xy101AK—Loamy high flood plains.

172Xy202AK—Shallow drainages

Vegetation Name

Low shrub birch-willow/water sedge scrub

Landtype Associations

135A2.U1—Loamy Glaciolacustrine Uplands

This site is of minor occurrence throughout the Gulkana River area, primarily on glaciolacustrine uplands and occasionally as an inclusion on older stream terraces.

Soils Grouped Into This Site

Ewan

Description of the Site

Landscape:

This site consists of shallow, poorly defined drainages and upper margins of topographic depressions on glaciolacustrine uplands and occasionally on stream terraces. Slopes range from 0 to 8 percent. Elevation is generally 1,850 to 2,900 feet (564 to 884 m). Landscape position and soil hydrology and wetness appear to be the most important landscape features effecting this site.

Soils:

In most places, the soils on this site formed in loamy lacustrine deposits and alluvium. Surface organic mat ranges from 1 to 9 inches (2 to 23 cm). Standing and slow flowing water on the surface persists most of the growing season, and the soils are poorly to very poorly drained. A reduced matrix and reduction mottles occur throughout the mineral portion of the soil to 60 inches (152 cm) or more.

Vegetation:

Low shrub birch-willow/water sedge scrub is the correlated PNC on this site. In many stands, stunted *Picea mariana* and *Picea glauca* trees and clumps of trees are common.

Site Progression-Retrogression:

No progressive or retrogressive relationships or conditions are known to occur on this site.

172Xy203AK—Upper mountain slopes, shallow

Vegetation Name

Low shrub birch scrub

Landtype Associations

135A4.M1—Northern Low Mountains

In the Gulkana River area, this site is of minor occurrence in a few scattered locations above the Middle Fork and upper Main Stem.

Soils Grouped Into This Site

Cobblank, cool, and Goodview

Description of the Site

Landscape:
This site occurs on bedrock cored mountain slopes and summits above about 2,700 feet (823 m) elevation. Most areas have been smeared with a thin mantle of loamy till and lacustrine deposits. Slopes range from 0 to 30 percent.

Soils:
The moderately well developed soils on this site have a mantle of silty eolian material 1 to 4 inches (2 to 10 cm) thick over very gravelly and very cobbly loamy till and loamy lacustrine material. Bedrock is at depths of 10 to 20 inches (25 to 51 cm) in most places. The soils are well drained.

Vegetation:
Low shrub birch scrub is the correlated PNC on this site.

Site Progression-Retrogression:
No progressive or retrogressive relationships or conditions are known to occur on this site.

172Xy204AK—Gravelly and sandy hills

Vegetation Name

Low shrub birch/lichen scrub

Landtype Associations

135A3.G1—Gravelly and Sandy Glaciofluvial Uplands

In the Gulkana River area, this site is of minor occurrence in the uplands around Dickey Lake. It does continue, however, for a number of miles to the west beyond the survey area.

Soils Grouped Into This Site

Chistna, high elevation, and Pippod, high elevation

Description of the Site

Landscape:
This site occurs on pitted outwash plains and hills formed in deep, sandy and gravelly glacial outwash. Sandy blowouts are common in some areas. Slopes range from 0 to 30 percent. Elevation is 2,750 to 3,000 feet (838 to 914 m).

Soils:
The weakly to moderately well developed soils on this site have a mantle of silty eolian material 1 to 8 inches (2 to 20 cm) thick over very gravelly or sandy glaciofluvial material. The soils have low moisture holding capacity and are somewhat excessively drained.

Vegetation:
Low shrub birch/lichen scrub is the correlated PNC on this site. On convex shoulders and summits of hills, Sparsely vegetated outwash appears to be the potential.

Site Progression-Retrogression:
No progressive or retrogressive relationships or conditions are known to occur on this site.

172Xy205AK—Loamy flood plains, wet

Vegetation Name

Low willow/water sedge scrub

Landtype Associations

135A1.V1—Gravelly and Loamy Flood Plains
135A1.V2—Northcentral Loamy Flood Plains and Stream Terraces

In the Gulkana River area, this site occurs primarily along the upper Middle Fork, and in scattered locations along the Main Stem between Paxson Lake and the Middle Fork confluence and along the upper North Branch.

Soils Grouped Into This Site

Hisna; Swedna, high elevation; and Tangoe, wet, frequently flooded

Description of the Site

Landscape:
This site consists primarily of level to slightly sloping flood plains formed in stratified sandy and silty alluvium over very gravelly and cobbly alluvium along clear water rivers and streams. Terrace height above the mean summer channel level is typically 3 feet (0.9 m) or less and the site is frequently to occasionally flooded. Throughout most of the growing season, the water table remains at or near the surface; ponded areas are common. Elevation is generally from 2,400 to 2,900 feet (732 to 884 m).

Soils:
The weakly developed soils on this site have a mantle of stratified sandy and silty alluvium less than 10 to as much as 37 inches (less than 25 to as much as 94 cm) thick over very gravelly and cobbly alluvium. The surface organic mat ranges from 0 to occasionally as much as 13 inches (0 to occasionally as much as 33 cm). Depth to a seasonally high water table ranges from 0 to 18 inches (0 to 46 cm) and the soils are poorly to very poorly drained. During most years, the water table is at or near the surface during much of the growing season, and ponded areas are common. Aquic conditions, including redox depletions and/or a reduced matrix, are present within 10 inches (25 cm) of the mineral surface.

Vegetation:
Low willow/water sedge scrub is the correlated PNC on this site. This PNC is best

characterized as a riparian association that develops and persists under a regime of nearly continuous fluvial disturbance. Microsites on slightly higher terrace positions and/or with better soil drainage support Low willow/herb scrub.

Site Progression-Retrogression:

This site represents an early stage of flood plain-stream terrace development along low to moderate gradient stream channels. Channel migration and down-cutting, continued deposition of alluvium, or changes in subsurface drainage regimes will raise the effective height of the flood plain and reduce site wetness. Site progression would be expected to lead to 172Xy200AK—Gravelly flood plains, moderately wet or 172Xy201AK—Loamy flood plains, moderately wet. As the terrace level relative to the stream channel continues to increase, site progression would eventually lead to ecological site 172Xy101AK—Loamy high flood plains.

Beaver activity is extensive on this site. In many places, the shallow water table and ponded conditions appear to be partly if not entirely attributed to dam building. Often, the beaver dams form the escarpment breaks between different terrace levels. Reduced beaver activity, to the extent that dams and water levels could not be maintained, could lead to site progression of this site toward ecological sites 172Xy200AK—Gravelly flood plains, moderately wet or 172Xy201AK—Loamy flood plains, moderately wet, even without appreciable changes in terrace height. Conversely, increased beaver activity that increases the degree or extent of ponding and soil moisture, could cause site retrogression toward ecological site 172Xy500AK—Loamy riverbanks.

172Xy500AK—Loamy riverbanks

Vegetation Name

Sedge-grass riparian meadow

Landtype Associations

135A1.V1—Gravelly and Loamy Flood Plains
135A1.V2—Northcentral Loamy Flood Plains and Stream Terraces
135A1.V7—South Branch Deep Loamy Flood Plains and Stream Terraces

This site occurs throughout the Gulkana River area but is most prevalent along the Middle Fork, the Main Stem north of canyon rapids, the upper reaches of the North and South Branches, and the lower reaches of the West Fork.

Soils Grouped Into This Site

Aquatna and Swedna, very poorly drained

Description of the Site

Landscape:

This site occurs along the continuously wetted banks of low to moderate gradient, clear water rivers and streams. Areas occupied by this site are typically 2 to 40 feet (0.6 to 12 m) wide along the edges of the channel and sloughs. Terrace height above the mean summer channel level is typically less than 2 feet (less than 0.6 m). During periods of peak runoff, most or all of this site is under water. As the water level drops during the course of the summer, the site becomes progressively more exposed. However, the water table remains at or near the surface throughout the growing season. Soil slope ranges

from nearly level on top of the flood plain or terrace to moderately steep at the edge of the channel. Elevation is 1,850 to 2,900 feet (564 to 884 m).

Soils:

The weakly developed soils on this site typically formed in stratified sandy and silty alluvium over very gravelly and cobbly alluvium. Depth to gravel and cobbles ranges from occasionally less than 10 inches (less than 25 cm) to 60 inches (152 cm) or more. Depth to a seasonally high water table ranges from 4 inches (10 cm) above the surface during peak runoff to an average of about 12 inches (30 cm) below the surface during most of the remainder of the growing season. The soils are very poorly drained. Aquic conditions, including redox depletions and/or a reduced matrix, are present within 10 inches (25 cm) of the soil surface.

Vegetation:

Sedge-grass riparian meadow is the correlated PNC on this site. Scattered willows are present in many stands. This vegetation is best described as a riparian association, which develops and persists under a regime of annual flooding and continuous wetness. Microsites on slightly higher terrace positions and/or with better soil drainage support low willow scrub.

Site Progression-Retrogression:

This site typically is restricted to the immediate margin of channels and sloughs and is subject to nearly continuous flooding by flowing water during the growing season. Over time, channel migration or down-cutting that leads to reduced duration of flooding, lowering of the water table, or an increase in terrace height could result in a progression of the site toward 172Xy205AK—Loamy flood plains, wet; 172Xy201AK—Loamy flood plains, moderately wet; or 172Xy200AK—Gravelly flood plains.

172Xy501AK—Wet depressions

Vegetation Name

Sedge wet meadow

Landtype Associations

135A1.V2—Northcentral Loamy Flood Plains and Stream Terraces
135A1.V4—Southern Loamy Flood Plains and Stream Terraces
135A1.V5—Lower Middle Fork Flood Plains and Stream Terraces
135A2.U1—Loamy Glaciolacustrine Uplands
135A2.U2—Clayey Glaciolacustrine Uplands
135A2.U3—Ruptic Glaciolacustrine Uplands
135A2.U4—Loamy Depressional Glaciolacustrine Uplands

This site occurs throughout the Gulkana River area on glaciolacustrine uplands and stream terraces.

Soils Grouped Into This Site

Cryofibrists and Hufman

Description of the Site

Landscape:

This site occurs on moderately thick to very thick accumulations of peat in shallow

depressions; along the shores of ponds and lakes; and in abandoned channels and sloughs on lacustrine terraces, till plains, and stream terraces. Most areas of this site are ponded throughout the growing season. Source of water is surface and subsurface drainage from surrounding uplands and flooding on low stream terraces. The depth and duration of ponding increases toward the central, lower positions of the depressions and sloughs, as does the thickness of the organic materials. Slopes are 0 to 3 percent. Elevation is generally 1,900 to 3,000 feet (579 to 914 m).

Soils:

The organic soils on this site consist of fibrous or partially decomposed organic matter 16 to more than 60 inches (41 to more than 162 cm) thick over stratified sandy and silty alluvium and loamy and clayey lacustrine deposits. Depth to a seasonally high water table ranges from about 4 inches (10 cm) or more above to 12 inches (30 cm) below the soil surface, and the soils are typically very poorly drained. Aquic conditions include a histic epipedon, saturated conditions to the surface, and a reduced matrix where mineral layers are present.

Vegetation:

Sedge wet meadow is the correlated PNC on this site. In many places, the vegetation on this site exhibits zonal patterns with sedge-moss bog meadow occupying the wetter, central portions; sedge wet meadow occurring on somewhat higher positions; and mixed sedge-grass and grass meadows, often with scattered willows and shrub birch, along the upper margins and higher microsites.

Site Progression-Retrogression:

In many upland areas this site occurs in complex with ecological site 172Xy111AK—Peat Mounds, with the ice-cored peat mounds and ridges protruding from 2 to 30 feet (0.6 to 9.1 m) above the surrounding saturated, permafrost free sedge wet meadows. The peat mounds are believed to have developed from the wet meadows. Initial stages of peat mound development are probably due to an unusually thin cover of snow (*Williams and Smith 1989*), which allows deep frost penetration and frost heaving in winter. Heaving ground often forms discrete, irregularly spaced bumps several inches in height. The drier peat near the surface of these slightly elevated areas increases the overall insulating qualities of the overlying organic material, maintaining frozen soil conditions throughout the summer months and promoting the formation of ice crystals and masses. Abundant water from the adjoining wet meadows and ponds feeds the developing ice core of the mound.

As the surface is gradually elevated, changes in the plant community also occur on the peat mounds. Williams and Smith (*1989*) noted that *Carex* spp. and *Eriophorum* spp. died, as did Sphagnum moss during the first season. Shrubs, primarily bog birch and lichens, eventually replaced these communities. Peat mounds in the Gulkana River area support Low shrub birch scrub and Spruce/shrub birch woodland.

172Xy800AK—Escarpments

Landtype Associations

135A1.V1—Gravelly and Loamy Flood Plains
135A1.V3—Southcentral Loamy Flood Plains and Stream Terraces
135A1.V4—Southern Loamy Flood Plains and Stream Terraces

In the Gulkana River area, this site occurs along all reaches of the River. The best development is within the canyon on the Main Stem, along the mid portions of the West Fork, and near the West Fork-Main Stem confluence.

Soils Grouped Into This Site

Cryorthents and Cryochrepts

Description of the Site

Landscape:

This site consists of moderately steep to very steep escarpments and bluffs formed by mass wasting and accelerated erosion during down-cutting by rivers through thick glacial and glaciolacustrine deposits. Thermokarst features are evident on these sites where the river has undercut slopes and exposed permafrost. Slopes range from 20 to 80 percent. Slope aspect and gradient are the most influential characteristics on soil formation and present vegetation. Permafrost is often found within 60 inches of the surface on more northerly exposures and is generally absent on other aspects. Areas of mass wasting and accelerated erosion are extensive on the steepest slopes. Elevation is from 1,850 to 2,900 feet (564 to 884 m).

Soils:

The soils on this site formed in coarse grained alluvium, gravelly glacial till, and fine-grained glaciolacustrine deposits. Some soils have a mantle of silty eolian material up to 2 inches (5 cm) thick. Other characteristics range from poorly to moderately well developed, shallow to very deep over permafrost, and well to somewhat excessively drained.

Vegetation:

Vegetation on Escarpments varies widely. Very steep, unstable slopes subject to on-going mass wasting and accelerated soil erosion are barren to occasionally sparsely vegetated with scattered shrubs and herbs (cover type—Sparsely vegetated escarpments). In a few locations along the West Fork, dense herbaceous vegetation has developed and apparently stabilized the slope. On more stable slopes, Escarpments supports open to closed forest and scrub. Depending on such factors as aspect, slope, soil materials, and fire history, vegetation cover includes Quaking aspen forest, Quaking aspen-white spruce forest, White spruce forest, Spruce/alder woodland, Spruce/shrub birch woodland, and Low shrub birch scrub.

Moderately closed White spruce forest apparently is the most successionally advanced and stable vegetation type found on warm aspects and moderately steep and steep slopes. Spruce/shrub birch woodland is the latest successional stage on cooler, northerly aspects.

Site Progression-Retrogression:

No progressive or retrogressive relationships or conditions are known to occur on this site.

172Xy801AK—Loamy backslopes

Landtype Associations

135A4.M1—Northern Low Mountains

In the Gulkana River area, this site occurs on mid mountain slopes above the lower Middle Fork and the Main Stem north of the canyon.

Soils Grouped Into This Site

Nickolna

Description of the Site

Landscape:

This site occurs on lower and mid elevation mountains in what appears to be a transition between lower lacustrine and glacial landscapes and higher elevation bedrock controlled mountains. Seeps and groundwater discharge areas are present in some places. Slopes range from 4 to 50 percent. Elevation is 2,600 to 2,900 feet (792 to 884 m).

Soils:

The moderately well developed soils on this site formed in mixed gravelly glacial till and loamy glaciolacustrine deposits. Most have a thin mantle of silty loess. Cobbles and stones derived from local bedrock occur near and on the surface in some places. Bedrock is present below 6 inches (15 cm) in some soils, primarily at higher elevations. In most places, soils on this site are well drained.

Vegetation:

The potential vegetation on this site is best described as a complex of Spruce/alder woodland, Spruce/shrub birch woodland, and Low shrub birch scrub. The cover types occur in a patchy mosaic with no obvious site or successional relationships.

Site Progression-Retrogression:

No progressive or retrogressive relationships or conditions are known to occur on this site.

NRCS Accessibility Statement

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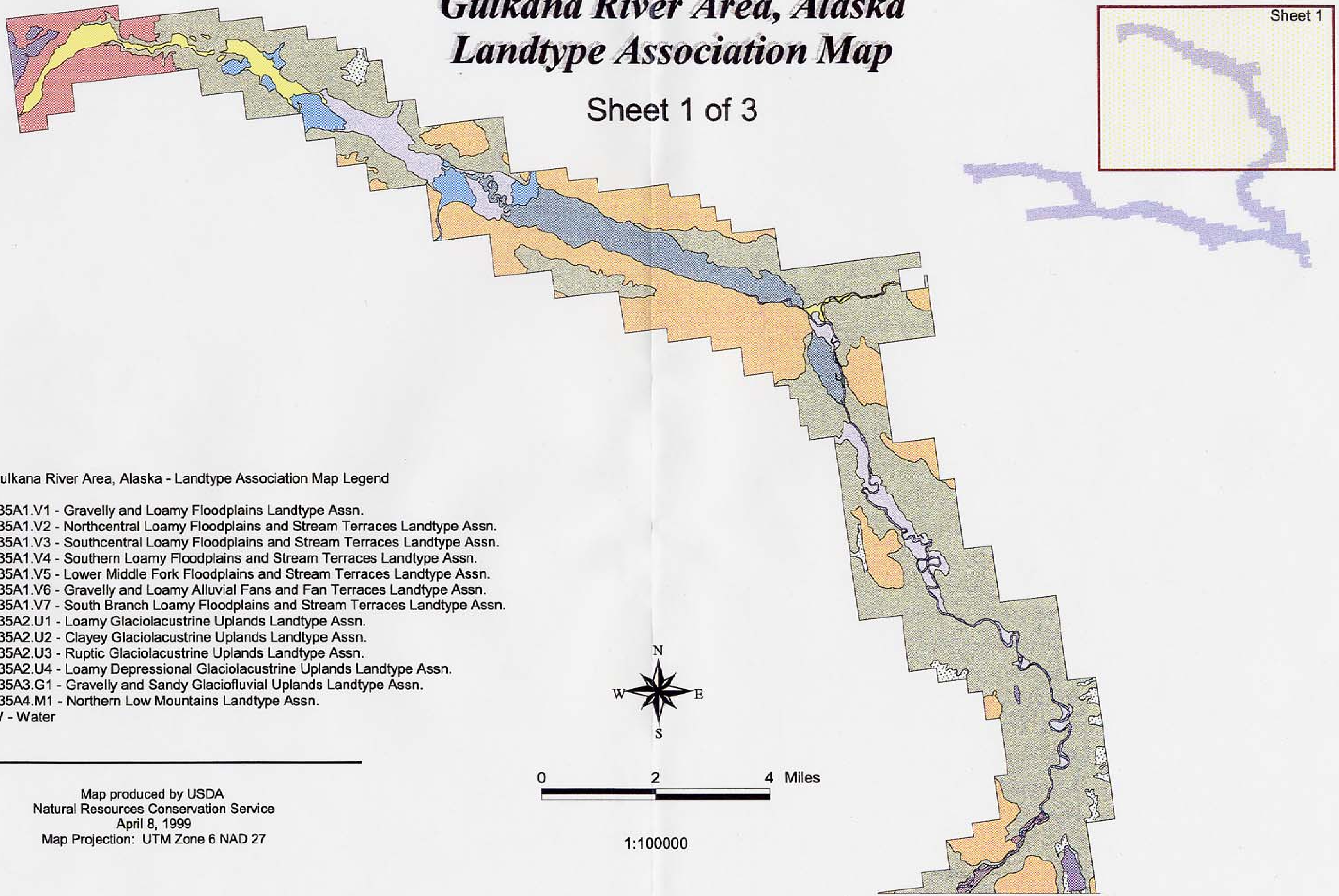
Gulkana River Area, Alaska
Landtype Association Map

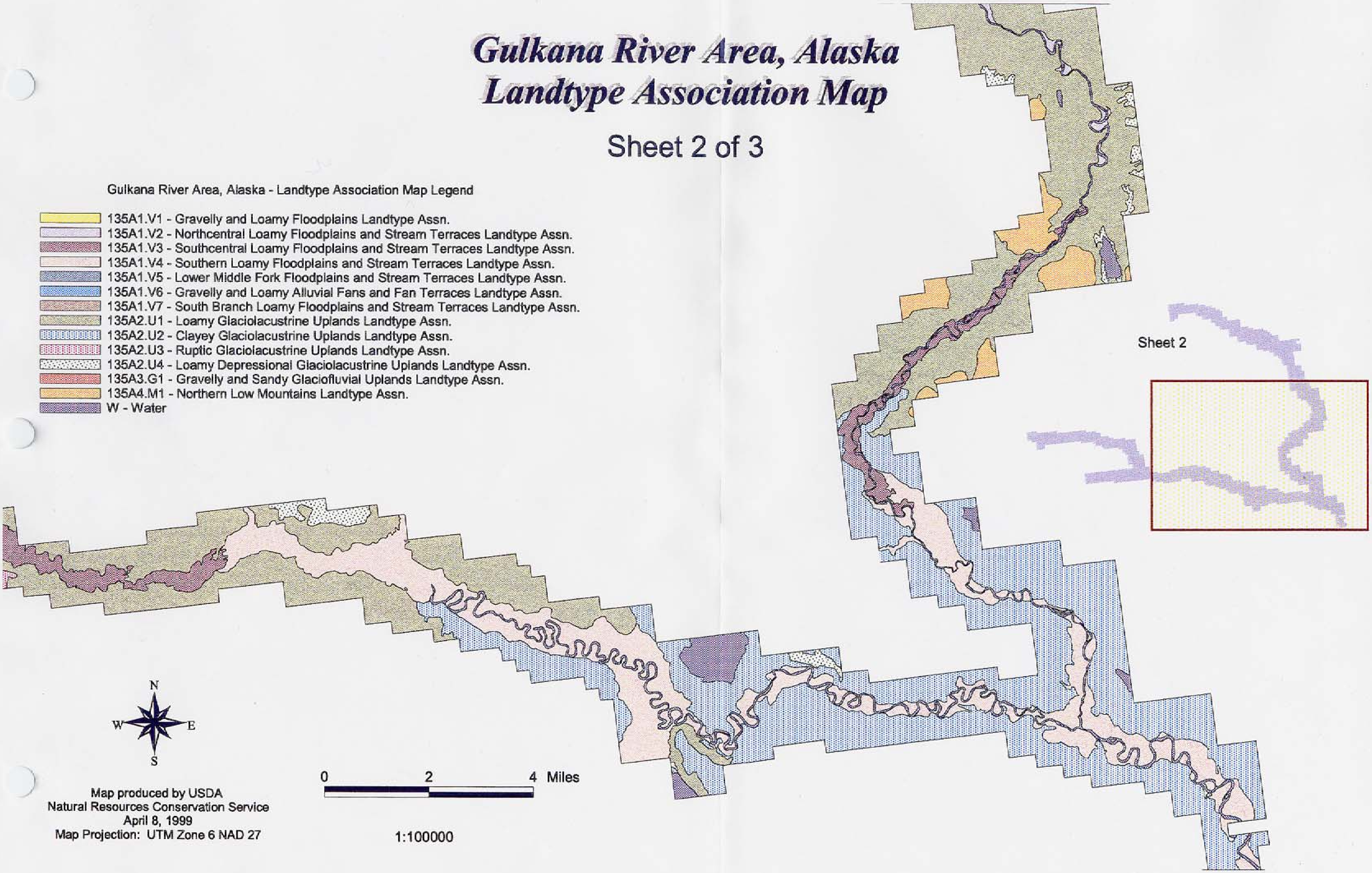
Sheet 1 of 3



Gulkana River Area, Alaska - Landtype Association Map Legend

- 135A1.V1 - Gravelly and Loamy Floodplains Landtype Assn.
- 135A1.V2 - Northcentral Loamy Floodplains and Stream Terraces Landtype Assn.
- 135A1.V3 - Southcentral Loamy Floodplains and Stream Terraces Landtype Assn.
- 135A1.V4 - Southern Loamy Floodplains and Stream Terraces Landtype Assn.
- 135A1.V5 - Lower Middle Fork Floodplains and Stream Terraces Landtype Assn.
- 135A1.V6 - Gravelly and Loamy Alluvial Fans and Fan Terraces Landtype Assn.
- 135A1.V7 - South Branch Loamy Floodplains and Stream Terraces Landtype Assn.
- 135A2.U1 - Loamy Glaciolacustrine Uplands Landtype Assn.
- 135A2.U2 - Clayey Glaciolacustrine Uplands Landtype Assn.
- 135A2.U3 - Ruptic Glaciolacustrine Uplands Landtype Assn.
- 135A2.U4 - Loamy Depressional Glaciolacustrine Uplands Landtype Assn.
- 135A3.G1 - Gravelly and Sandy Glaciofluvial Uplands Landtype Assn.
- 135A4.M1 - Northern Low Mountains Landtype Assn.
- W - Water

Map produced by USDA
Natural Resources Conservation Service
April 8, 1999
Map Projection: UTM Zone 6 NAD 27


Gulkana River Area, Alaska
Landtype Association Map
Sheet 2 of 3
Gulkana River Area, Alaska - Landtype Association Map Legend
135A1.V1 - Gravelly and Loamy Floodplains Landtype Assn.
135A1.V2 - Northcentral Loamy Floodplains and Stream Terraces Landtype Assn.
135A1.V3 - Southcentral Loamy Floodplains and Stream Terraces Landtype Assn.
135A1.V4 - Southern Loamy Floodplains and Stream Terraces Landtype Assn.
135A1.V5 - Lower Middle Fork Floodplains and Stream Terraces Landtype Assn.
135A1.V6 - Gravelly and Loamy Alluvial Fans and Fan Terraces Landtype Assn.
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135A2.U1 - Loamy Glaciolacustrine Uplands Landtype Assn.
135A2.U2 - Clayey Glaciolacustrine Uplands Landtype Assn.
135A2.U3 - Ruptic Glaciolacustrine Uplands Landtype Assn.
135A2.U4 - Loamy Depressional Glaciolacustrine Uplands Landtype Assn.
135A3.G1 - Gravelly and Sandy Glaciofluvial Uplands Landtype Assn.
135A4.M1 - Northern Low Mountains Landtype Assn.
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Map produced by USDA
Natural Resources Conservation Service
April 8, 1999
Map Projection: UTM Zone 6 NAD 27

Gulkana River Area, Alaska
Landtype Association Map

Sheet 3 of 3

0 2 4 Miles

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Gulkana River Area, Alaska - Landtype Association Map Legend

- 135A1.V1 - Gravelly and Loamy Floodplains Landtype Assn.
- 135A1.V2 - Northcentral Loamy Floodplains and Stream Terraces Landtype Assn.
- 135A1.V3 - Southcentral Loamy Floodplains and Stream Terraces Landtype Assn.
- 135A1.V4 - Southern Loamy Floodplains and Stream Terraces Landtype Assn.
- 135A1.V5 - Lower Middle Fork Floodplains and Stream Terraces Landtype Assn.
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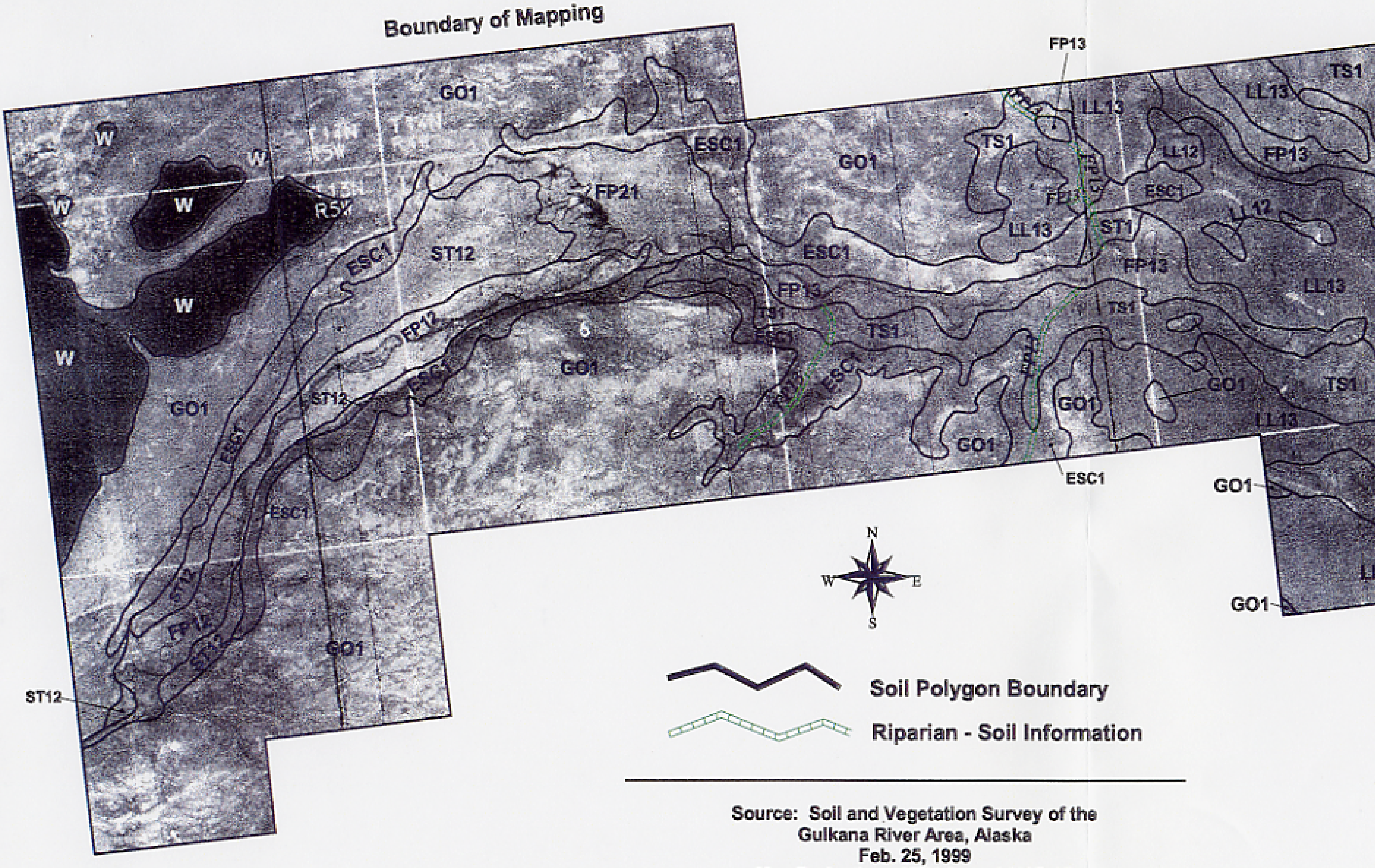
- 135A4.M1 - Northern Low Mountains Landtype Assn.
- W - Water

Map produced by USDA
Natural Resources Conservation Service
April 8, 1999
Map Projection: UTM Zone 6 NAD 27

Soils

Sheet 1 of 18

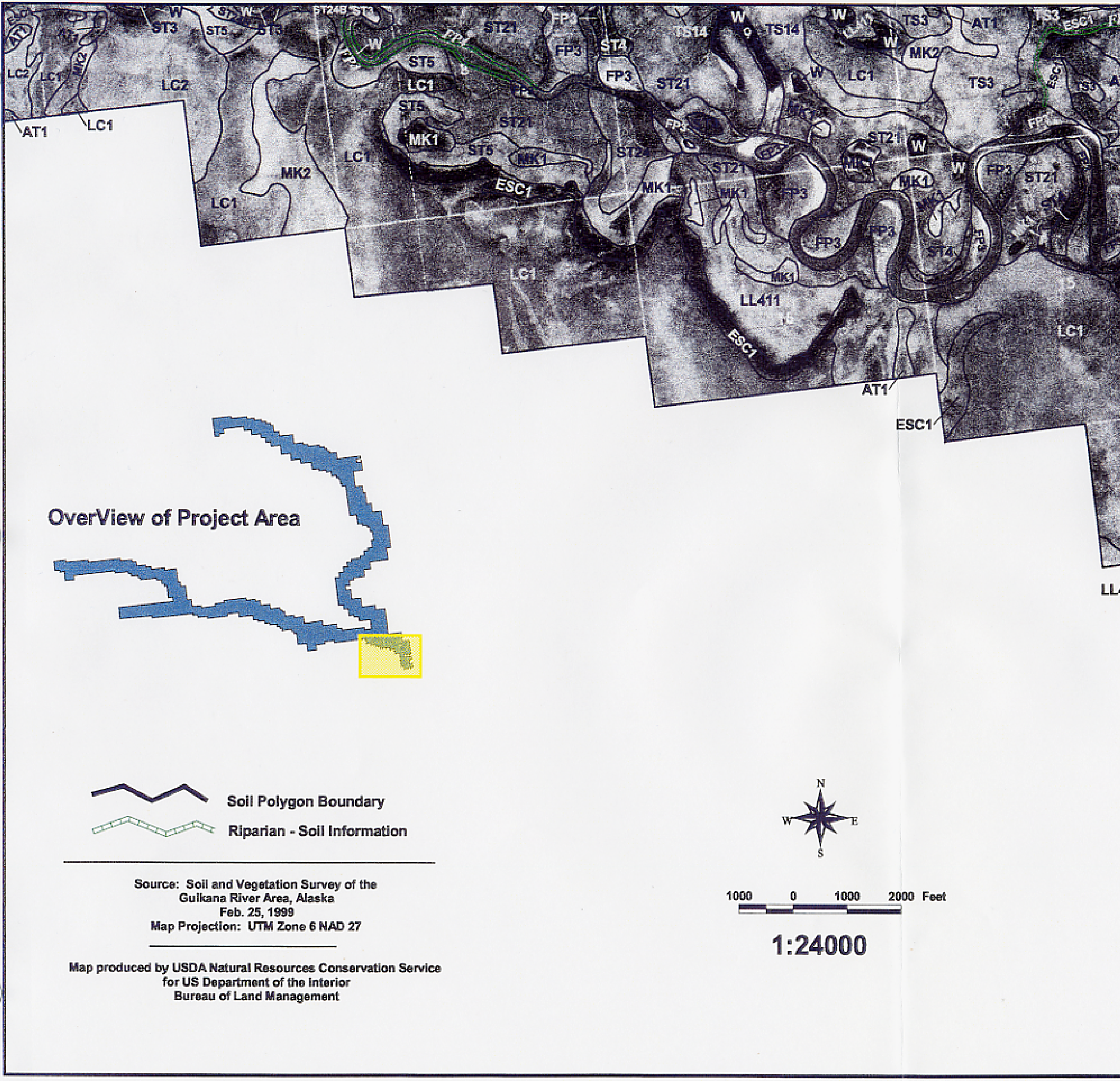


Soil Polygon Boundary

Riparian - Soil Information

Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27

Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management


OverView of Project Area
Soil Polygon Boundary
Riparian - Soil Information
Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27
Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management
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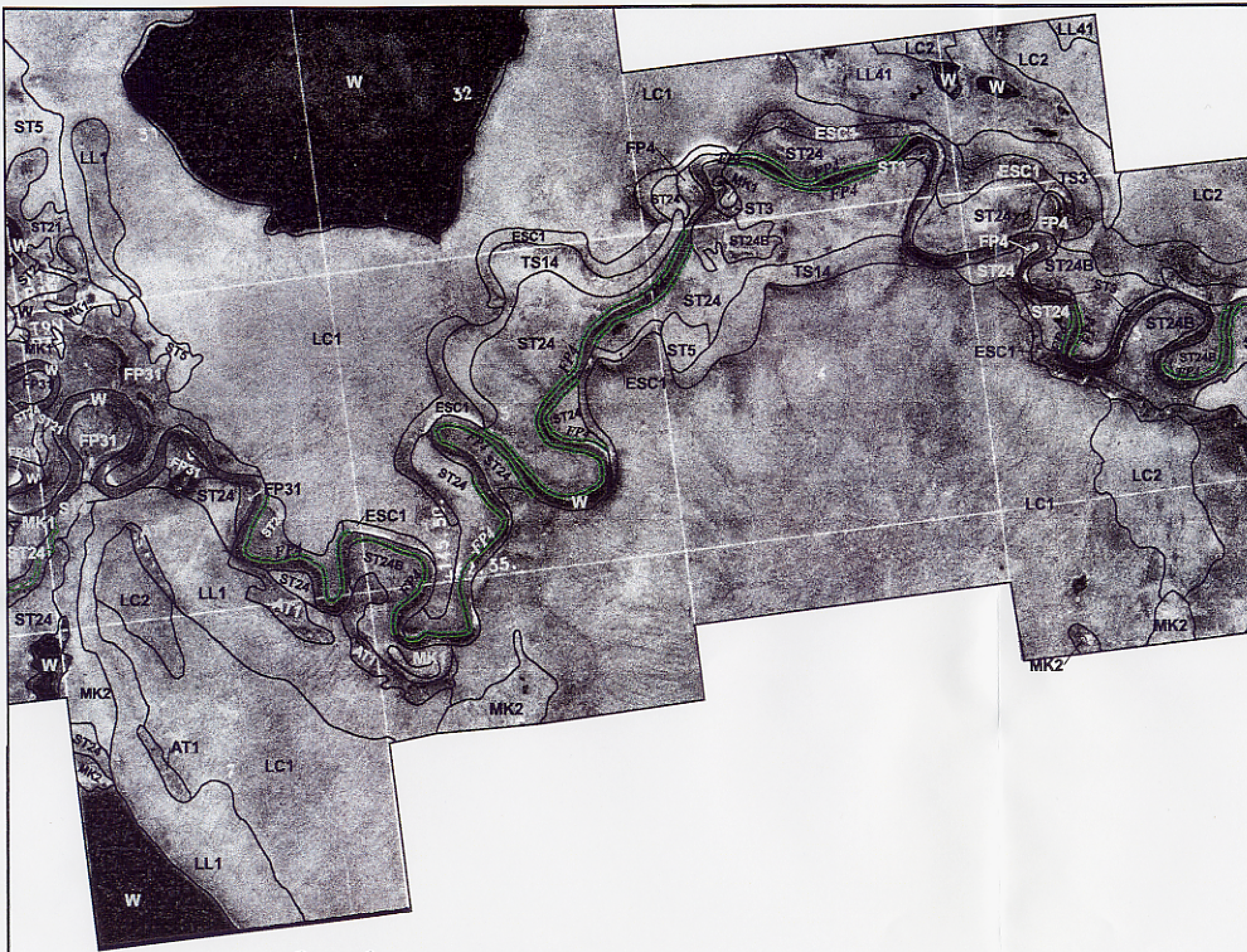

Soil Polygon Boundary

Riparian - Soil Information

Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27

Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management

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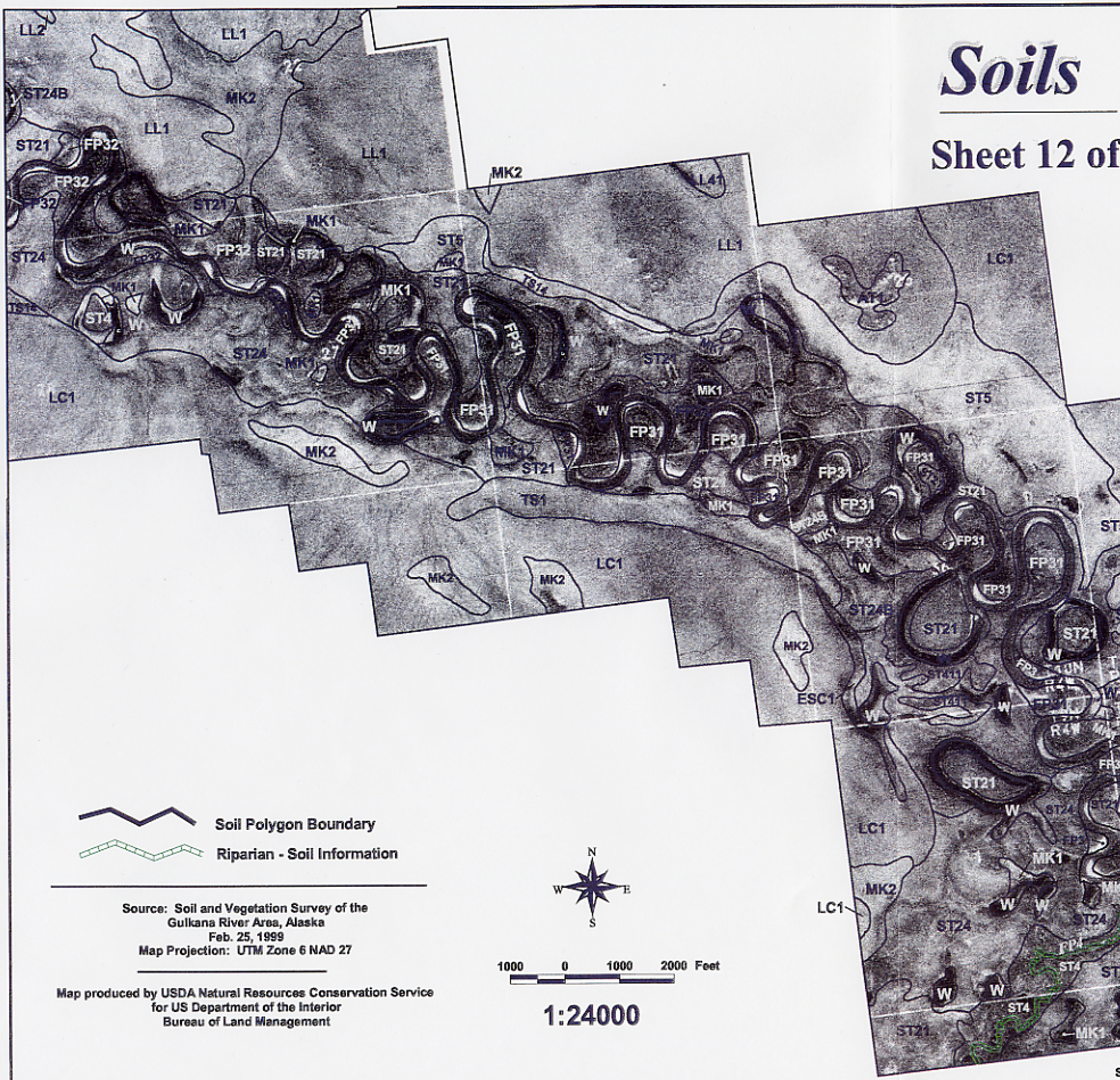
Soils

Sheet 12 of



Soil Polygon Boundary

Riparian - Soil Information

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Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27

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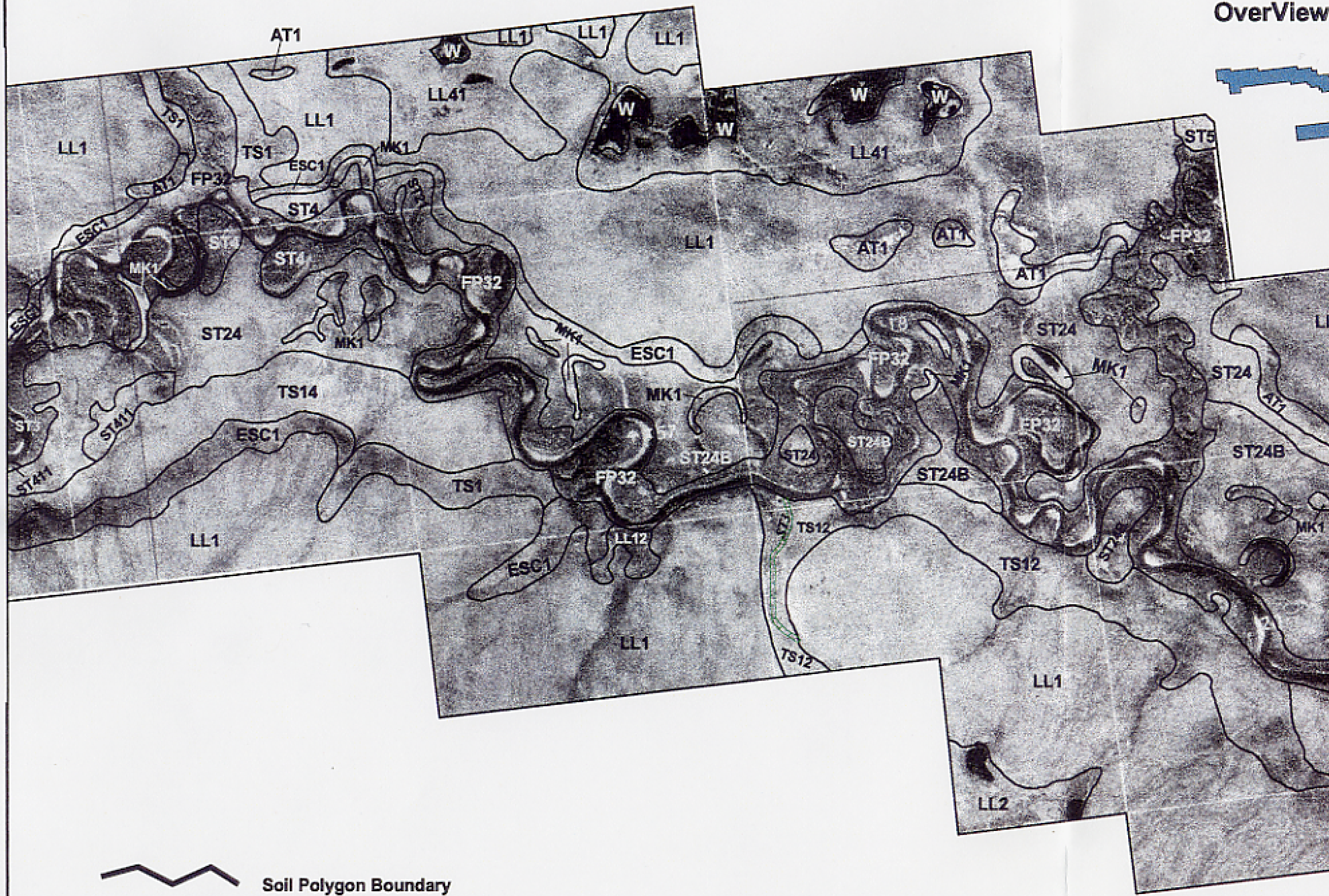
Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management



OverView

Soil Polygon Boundary

Riparian - Soil Information

Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27

Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management

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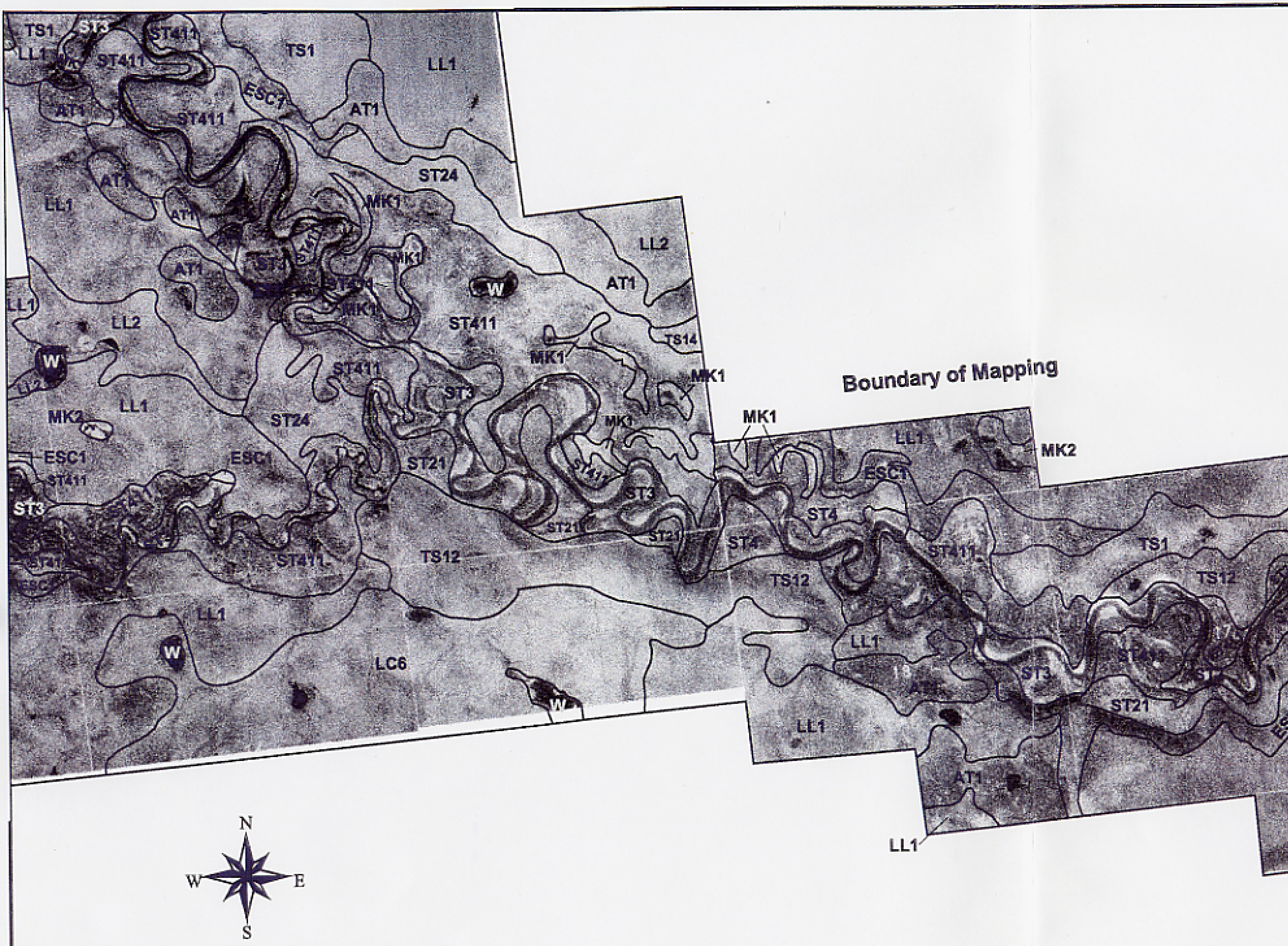

Soil Polygon Boundary

Riparian - Soil information

Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27

Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management

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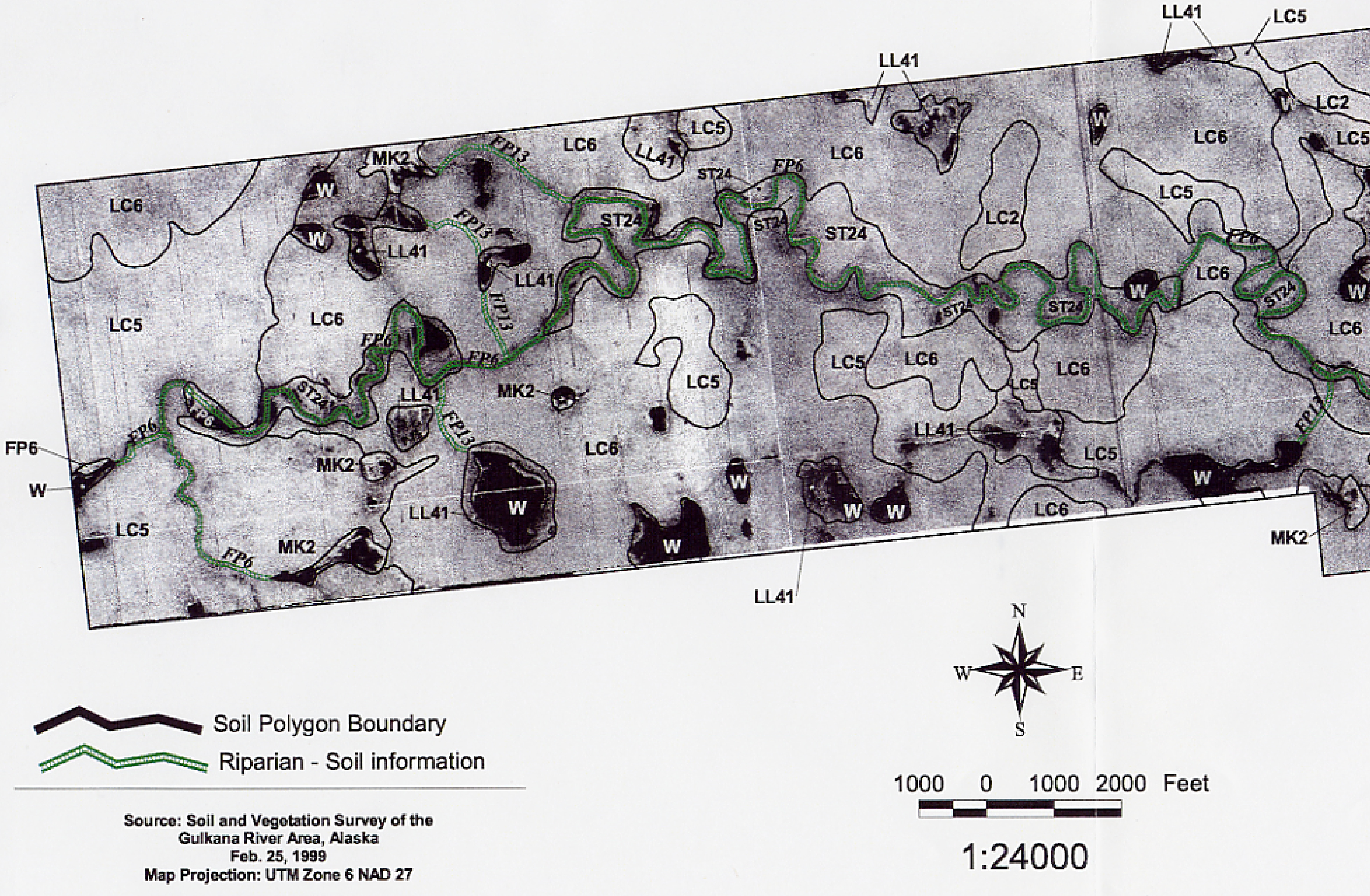
Soils

Sheet 15 of 18



Soil Polygon Boundary
Riparian - Soil information

Source: Soil and Vegetation Survey of the
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Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27

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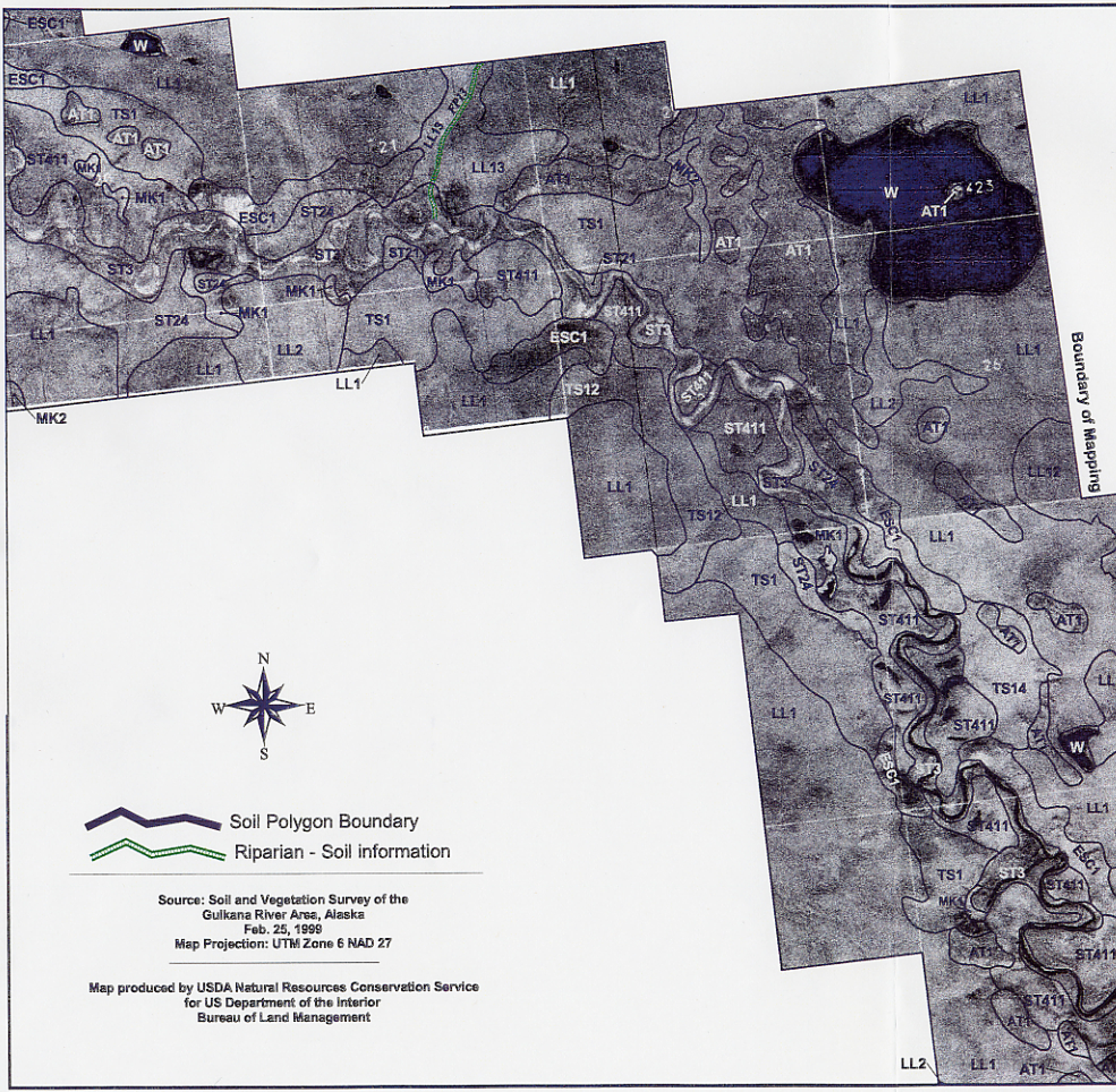
Bureau of Land Management


Boundary of Mapping
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Soil Polygon Boundary
Riparian - Soil information
Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27
Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management

Soils

Sheet 17 of 18

Soil Polygon Boundary
Riparian - Soil information

Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27

Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management

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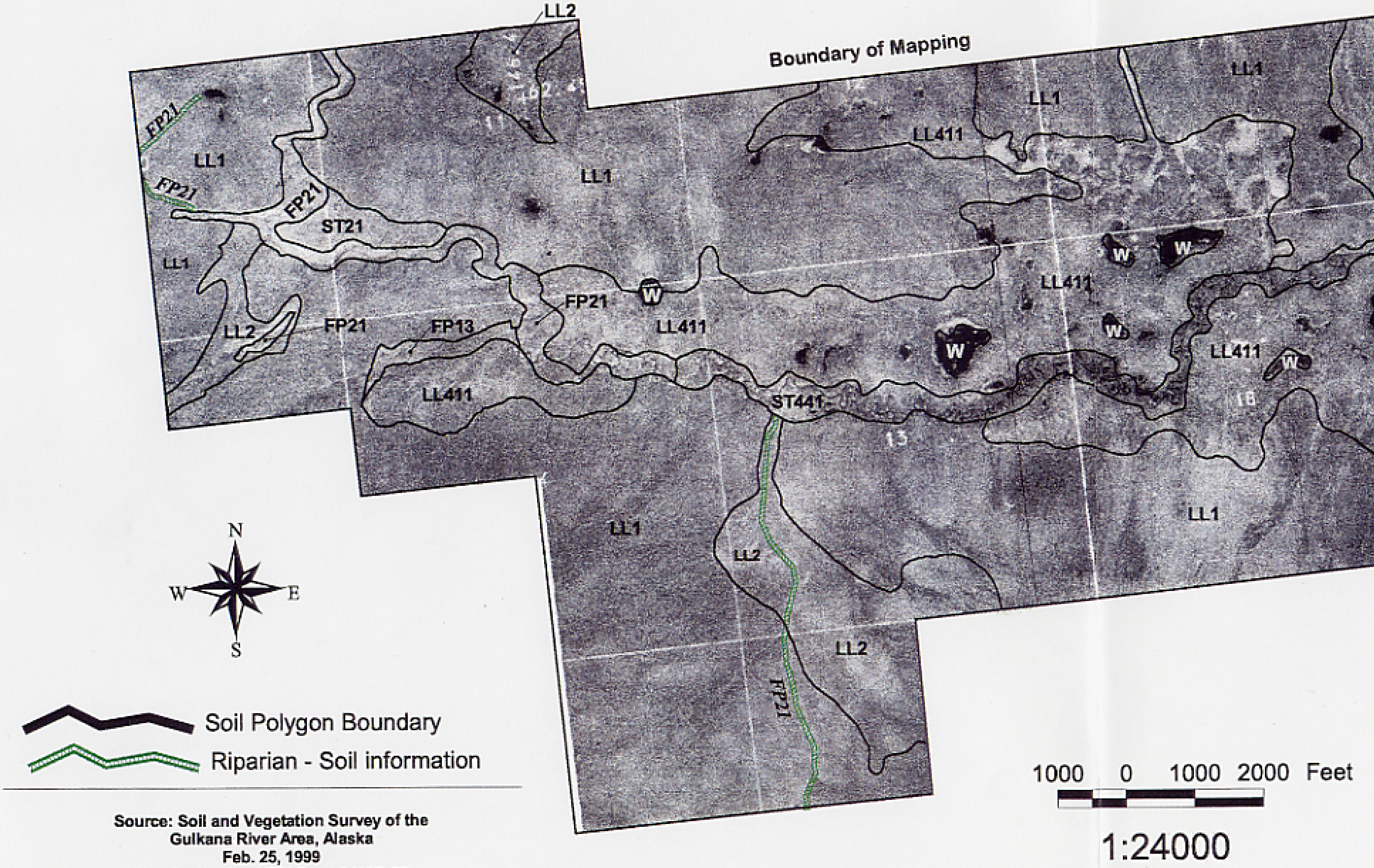
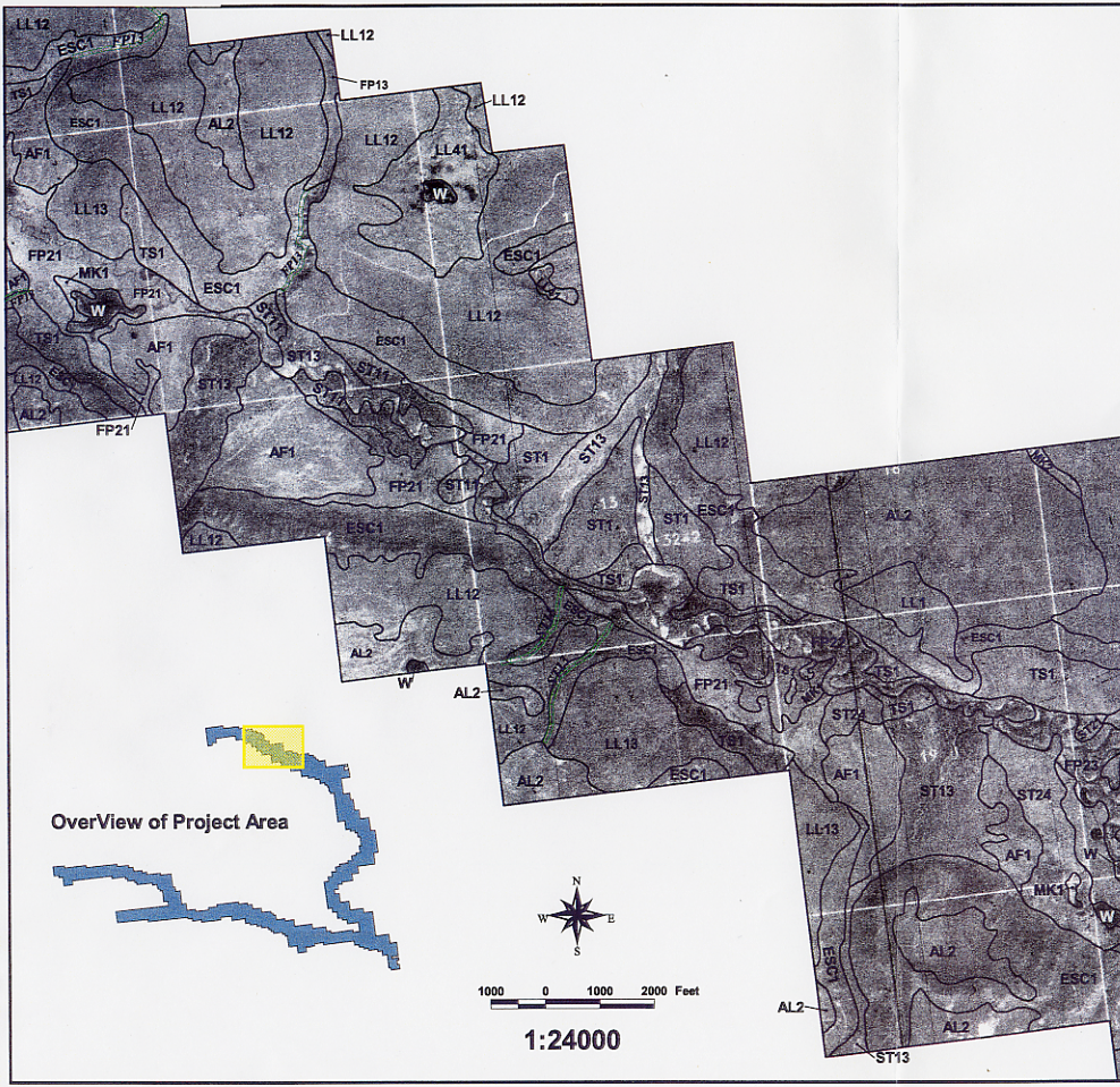
Soils

Sheet 18 of 18



Source: Soil and Vegetation Survey of the Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27

Map produced by USDA Natural Resources Conservation Service for US Department of the Interior Bureau of Land Management



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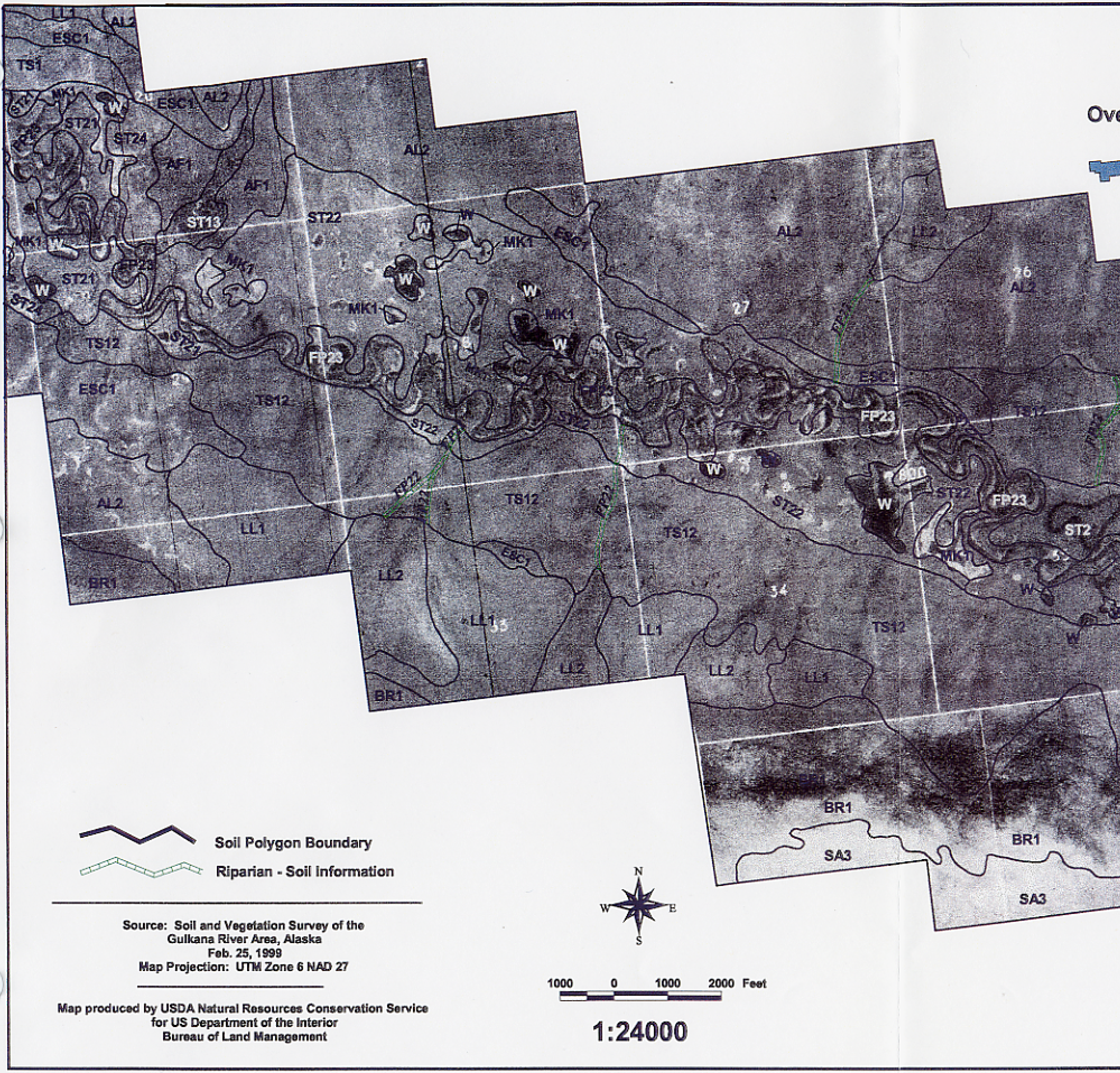
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Soil Polygon Boundary
Riparian - Soil Information
Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27
Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management
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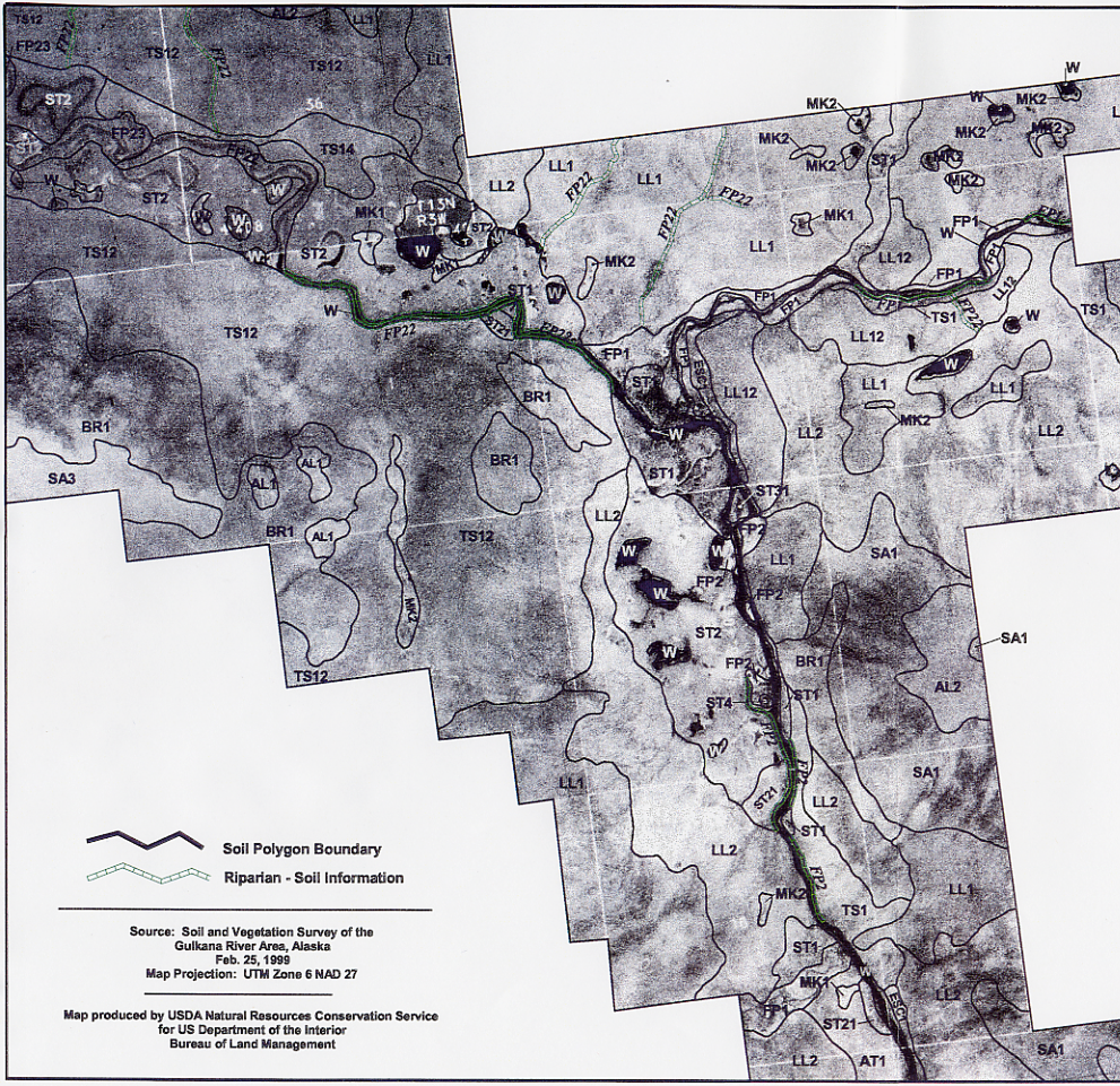
Soil Polygon Boundary
Riparian - Soil Information
Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27
Map produced by USDA Natural Resources Conservation Service
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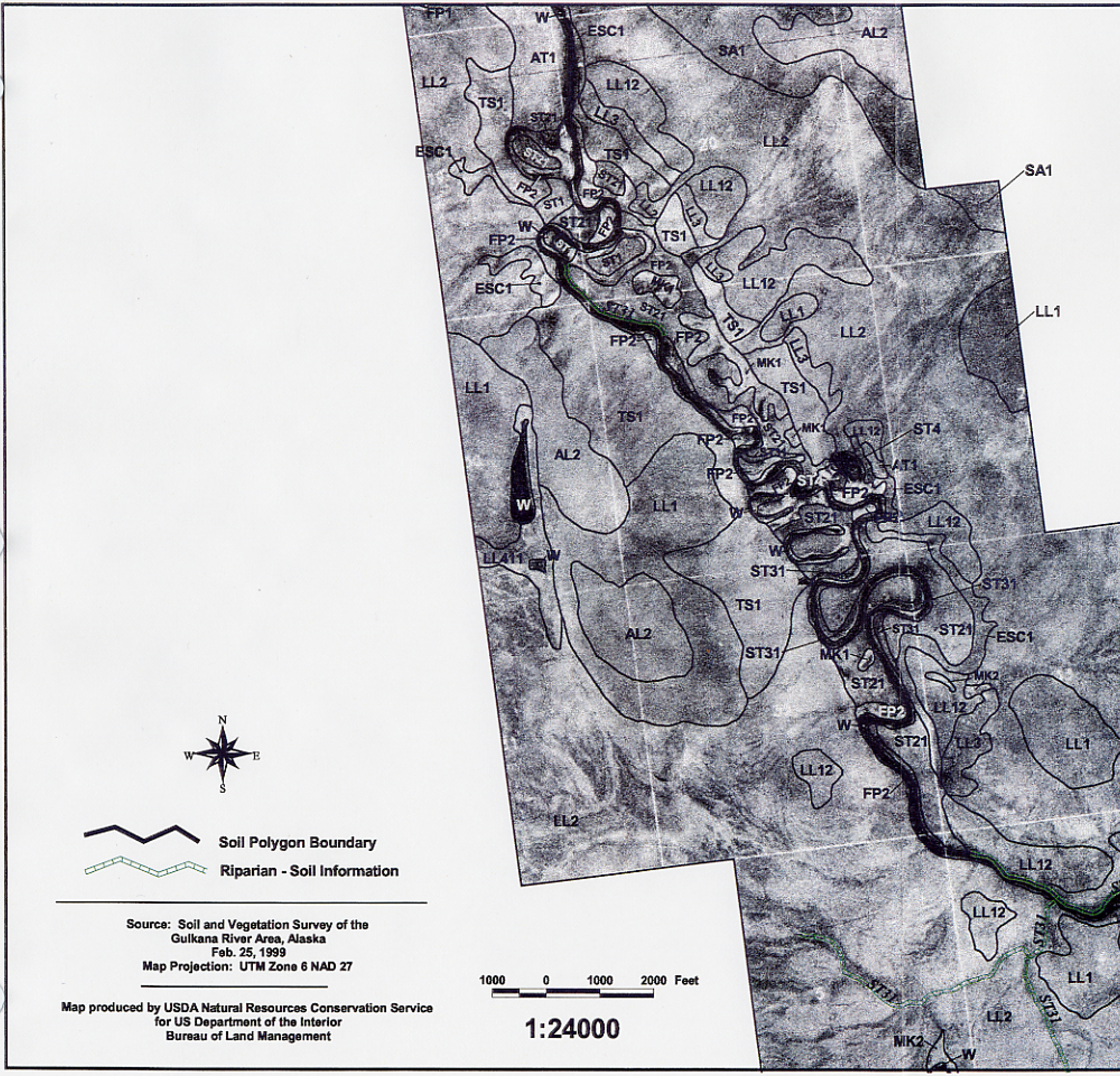
Bureau of Land Management



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Soil Polygon Boundary
Riparian - Soil Information
Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27
Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management
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OverView of Project Area
Soil Polygon Boundary
Riparian - Soil Information
Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27
Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management
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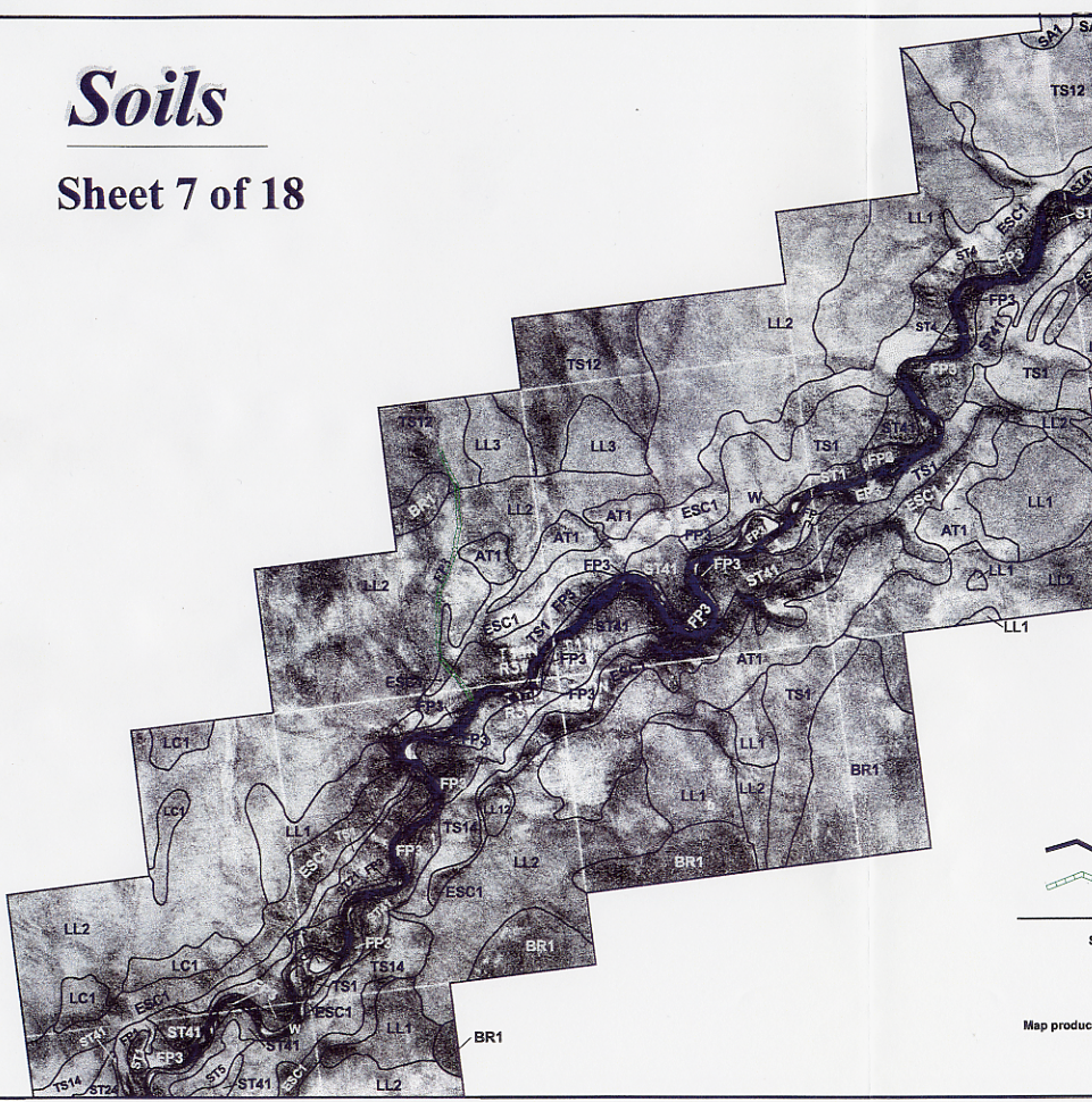
Soils

Sheet 7 of 18




OverView of Project Area
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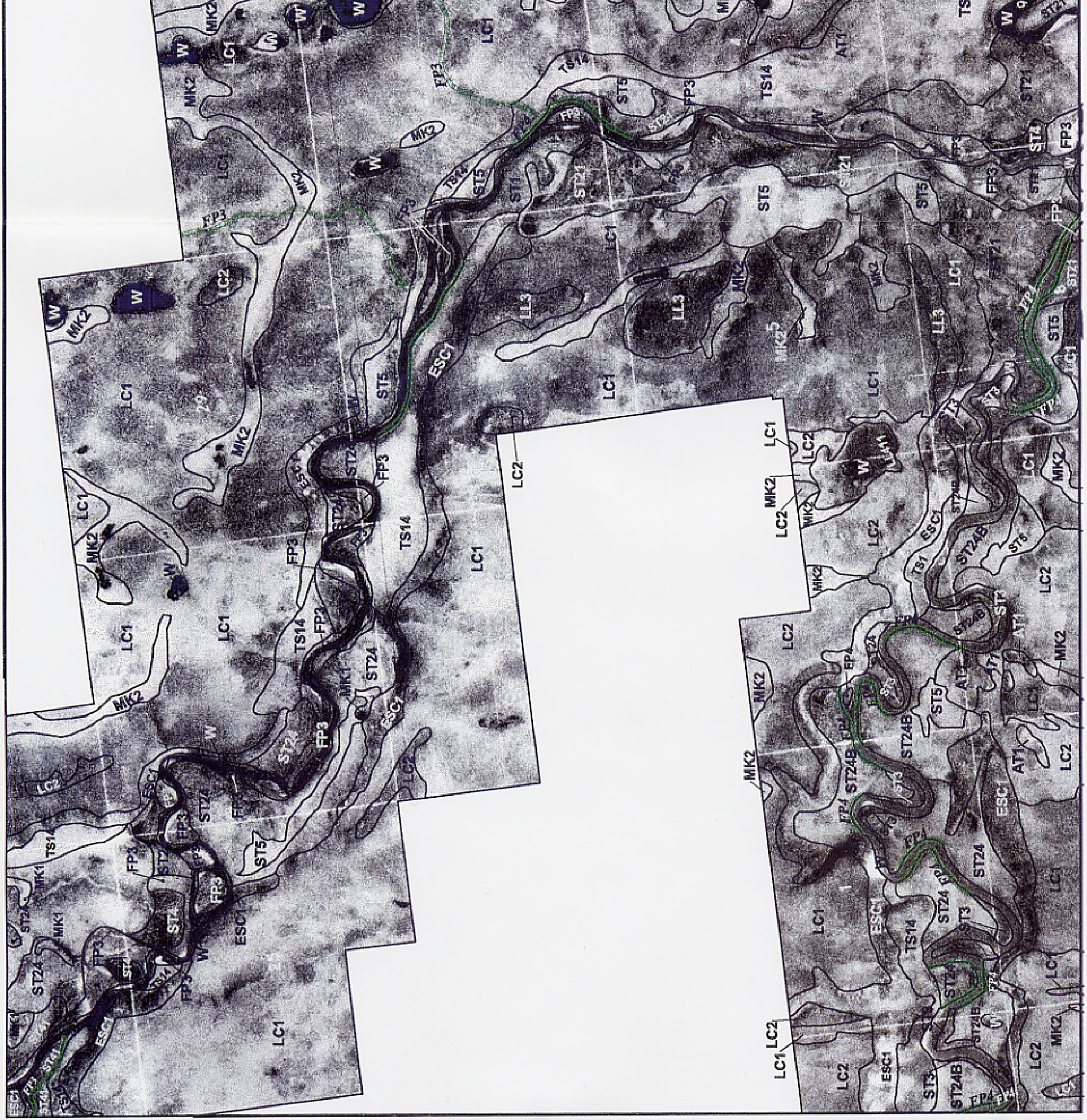

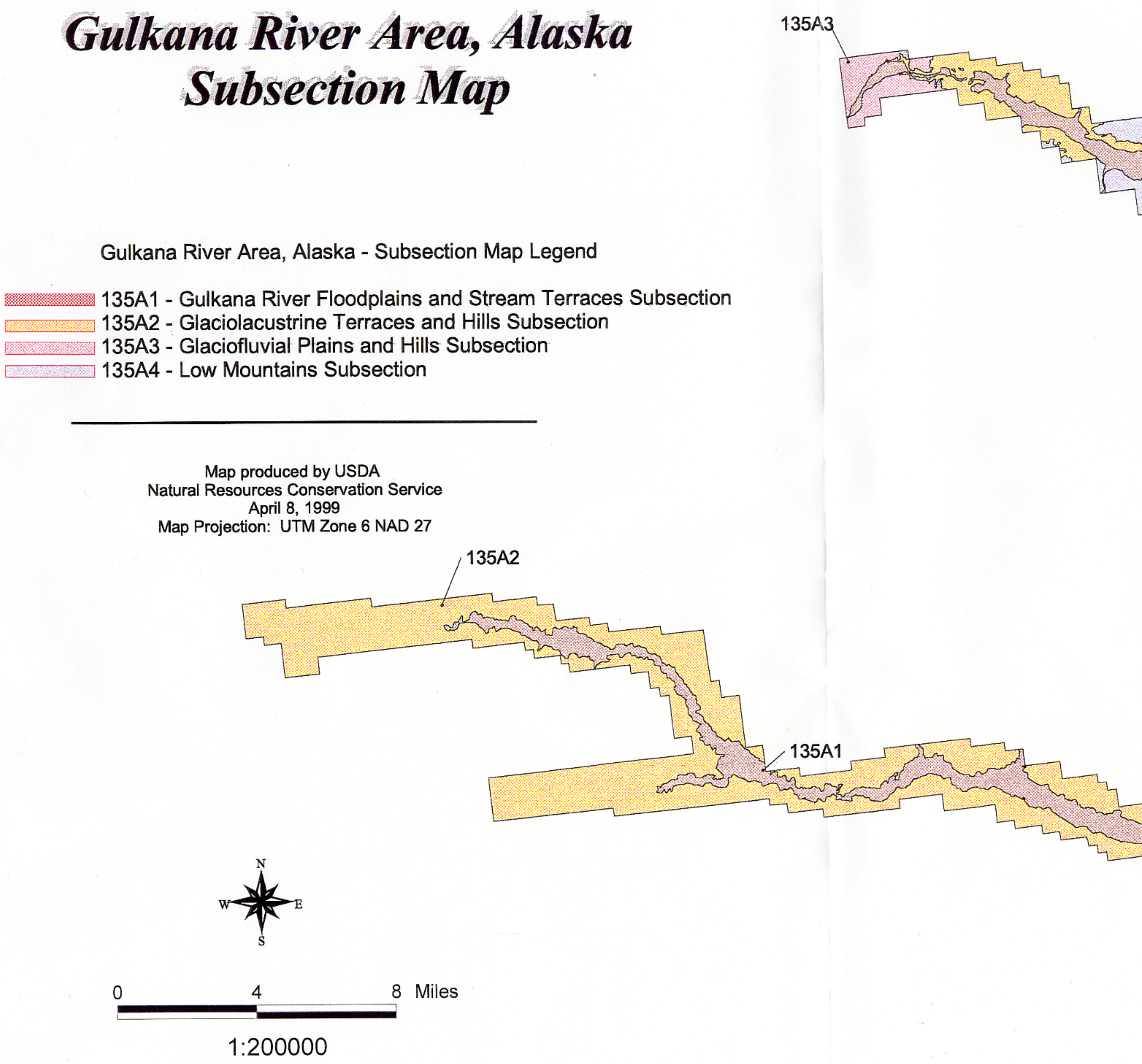
Gulkana River Area, Alaska
Subsection Map
Gulkana River Area, Alaska - Subsection Map Legend
135A1 - Gulkana River Floodplains and Stream Terraces Subsection
135A2 - Glaciolacustrine Terraces and Hills Subsection
135A3 - Glaciofluvial Plains and Hills Subsection
135A4 - Low Mountains Subsection
Map produced by USDA
Natural Resources Conservation Service
April 8, 1999
Map Projection: UTM Zone 6 NAD 27
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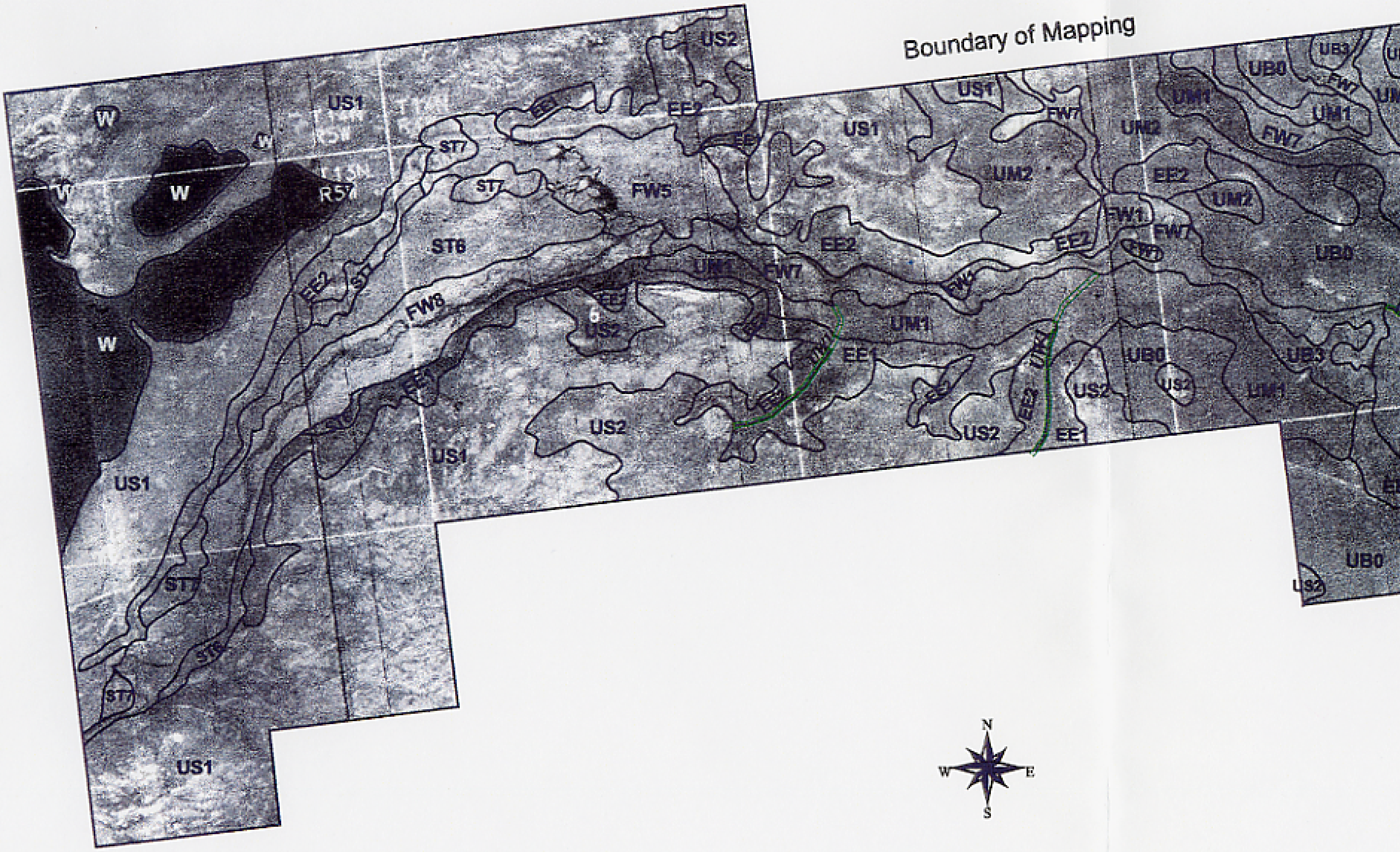
Vegetation

Sheet 1of 18



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Vegetation Polygon Boundary

Riparian Vegetation information

Map


OverView of Project Area
Vegetation Polygon Boundary
Riparian Vegetation information
Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
March 1, 1999
Map Projection: UTM Zone 6 NAD 27
Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management
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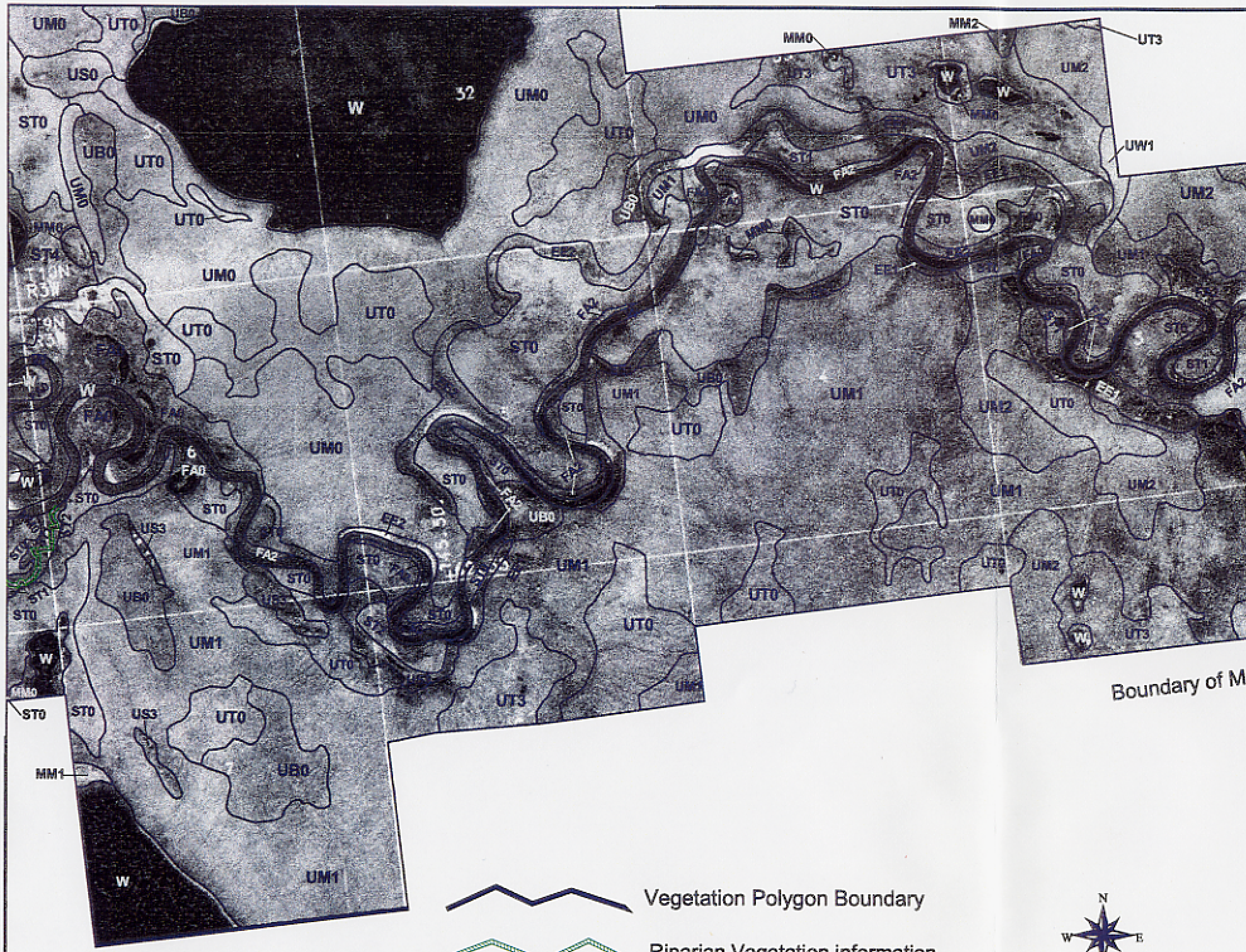

Vegetation Polygon Boundary

Riparian Vegetation information

Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
March 1, 1999
Map Projection: UTM Zone 6 NAD 27

Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management

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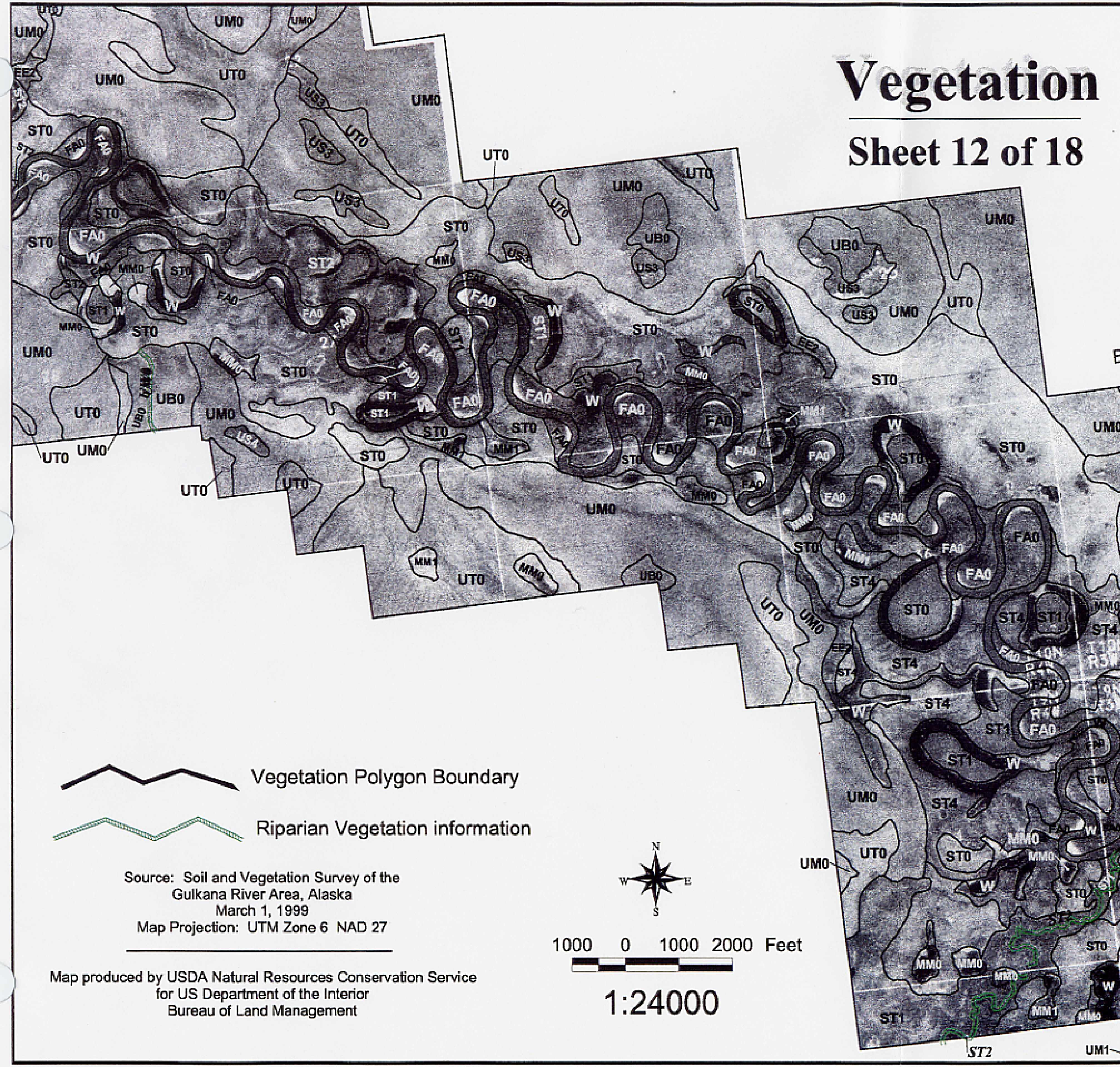
Vegetation

Sheet 12 of 18



Vegetation Polygon Boundary

Riparian Vegetation information

Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
March 1, 1999
Map Projection: UTM Zone 6 NAD 27

Map produced by USDA Natural Resources Conservation Service
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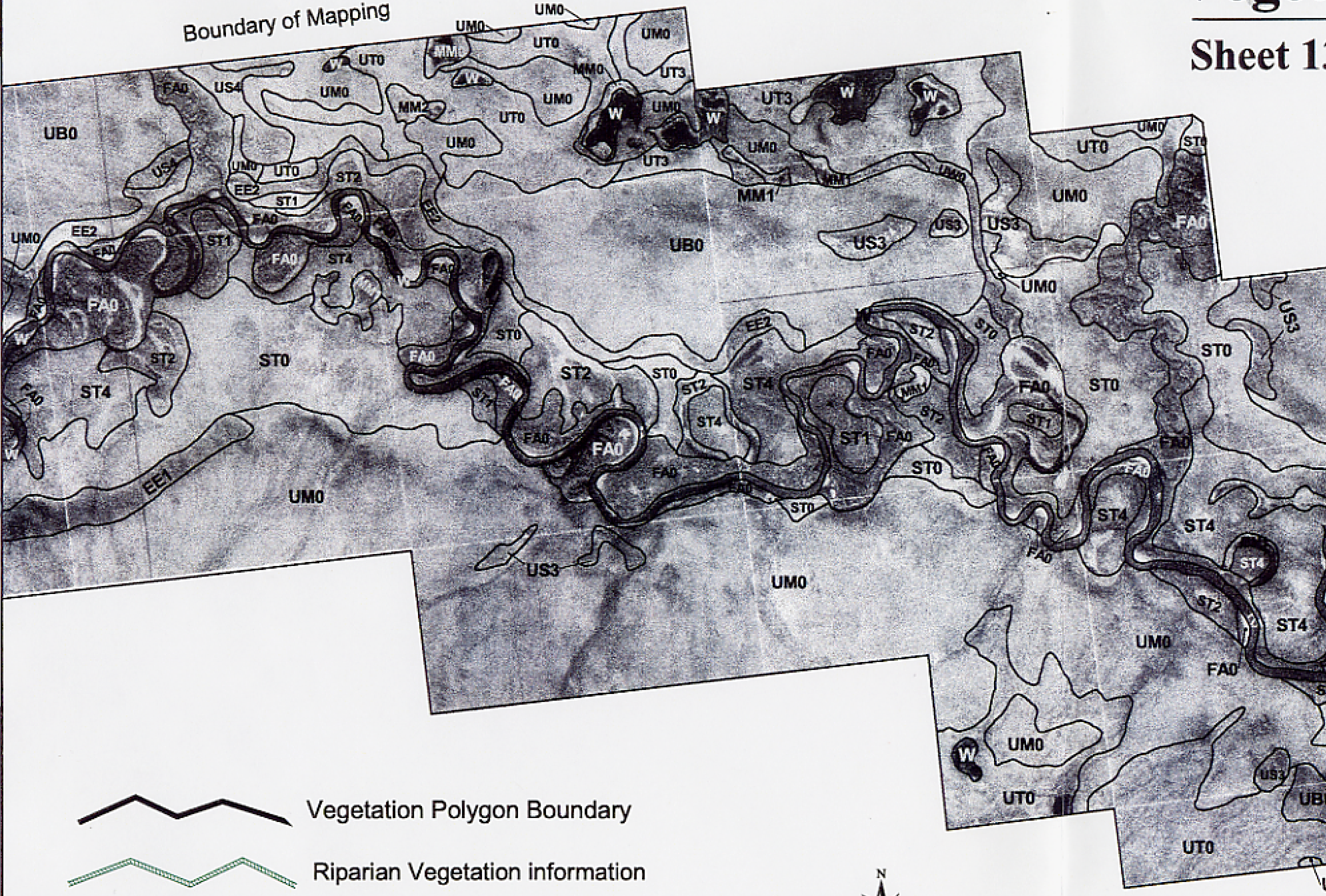
Bureau of Land Management

Veget

Sheet 1



Vegetation Polygon Boundary

Riparian Vegetation information

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Gulkana River Area, Alaska
March 1, 1999
Map Projection: UTM Zone 6 NAD 27

Map produced by USDA Natural Resources Conservation Service
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Bureau of Land Management

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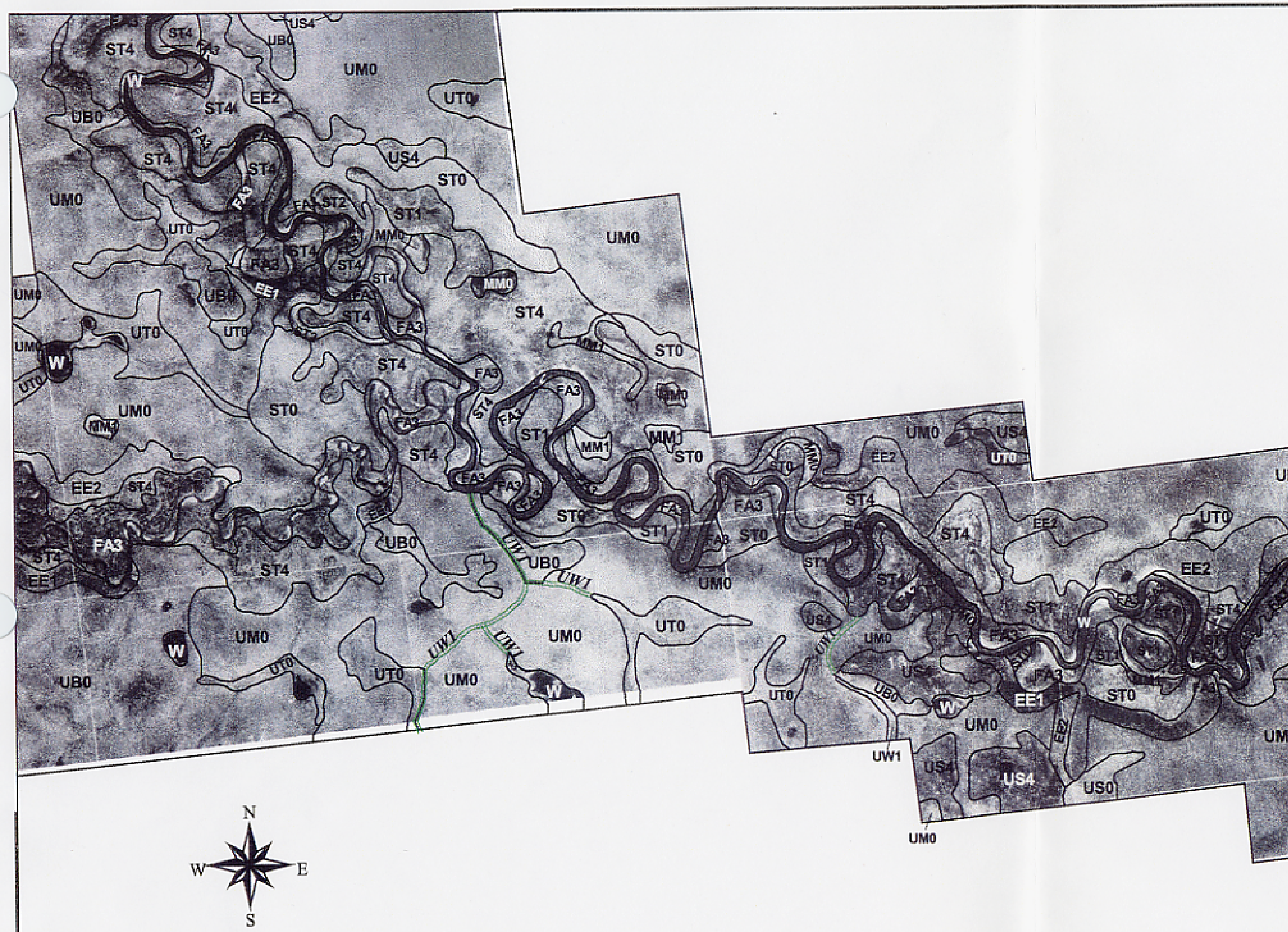

Vegetation Polygon Boundary

Riparian - Vegetation information

Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27

Map produced by USDA Natural Resources Conservation Service
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Bureau of Land Management

1000 0 1000 2000 Feet

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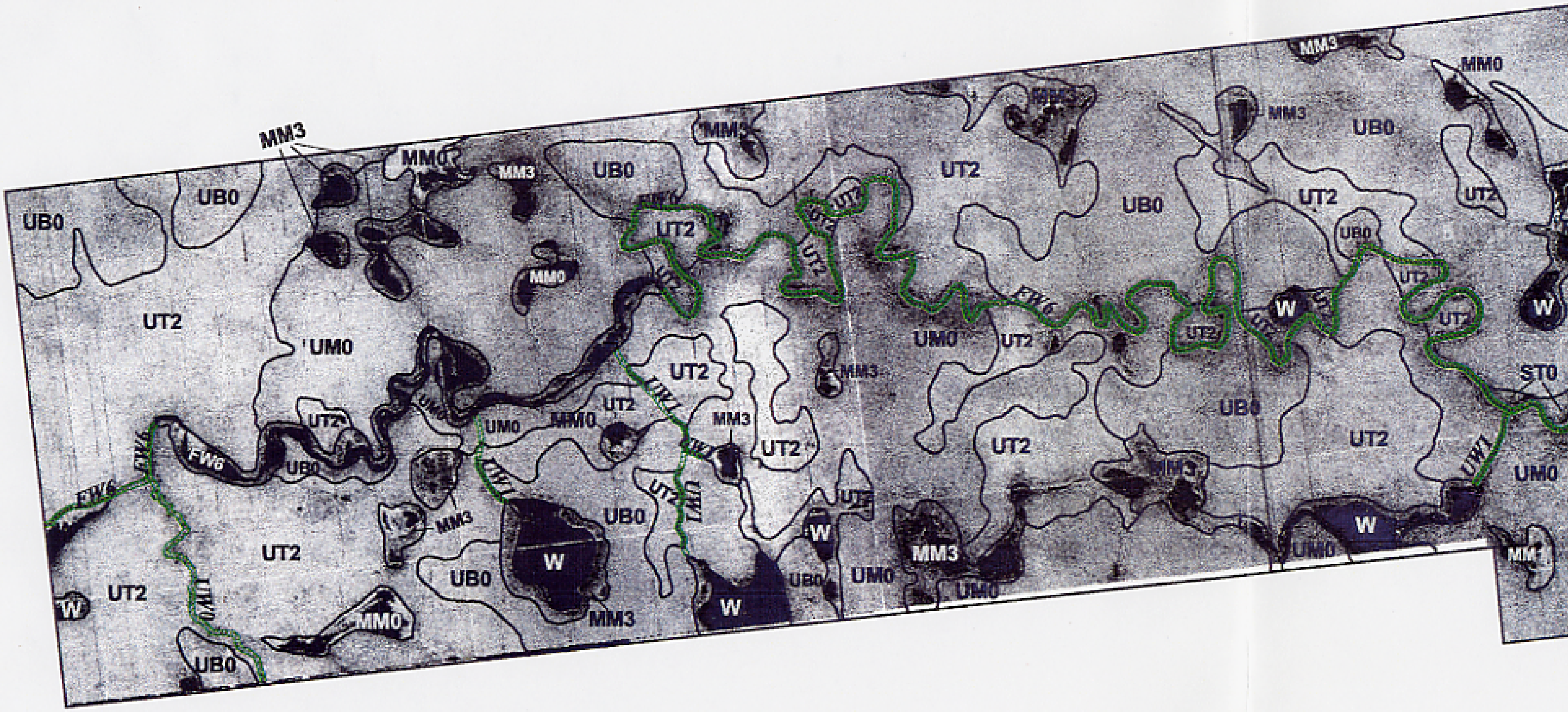
Vegetation

Sheet 15 of 18



Vegetation Polygon Boundary

Riparian - Vegetation information

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Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27

Map produced by USDA Natural Resources Conservation Service
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Bureau of Land Management

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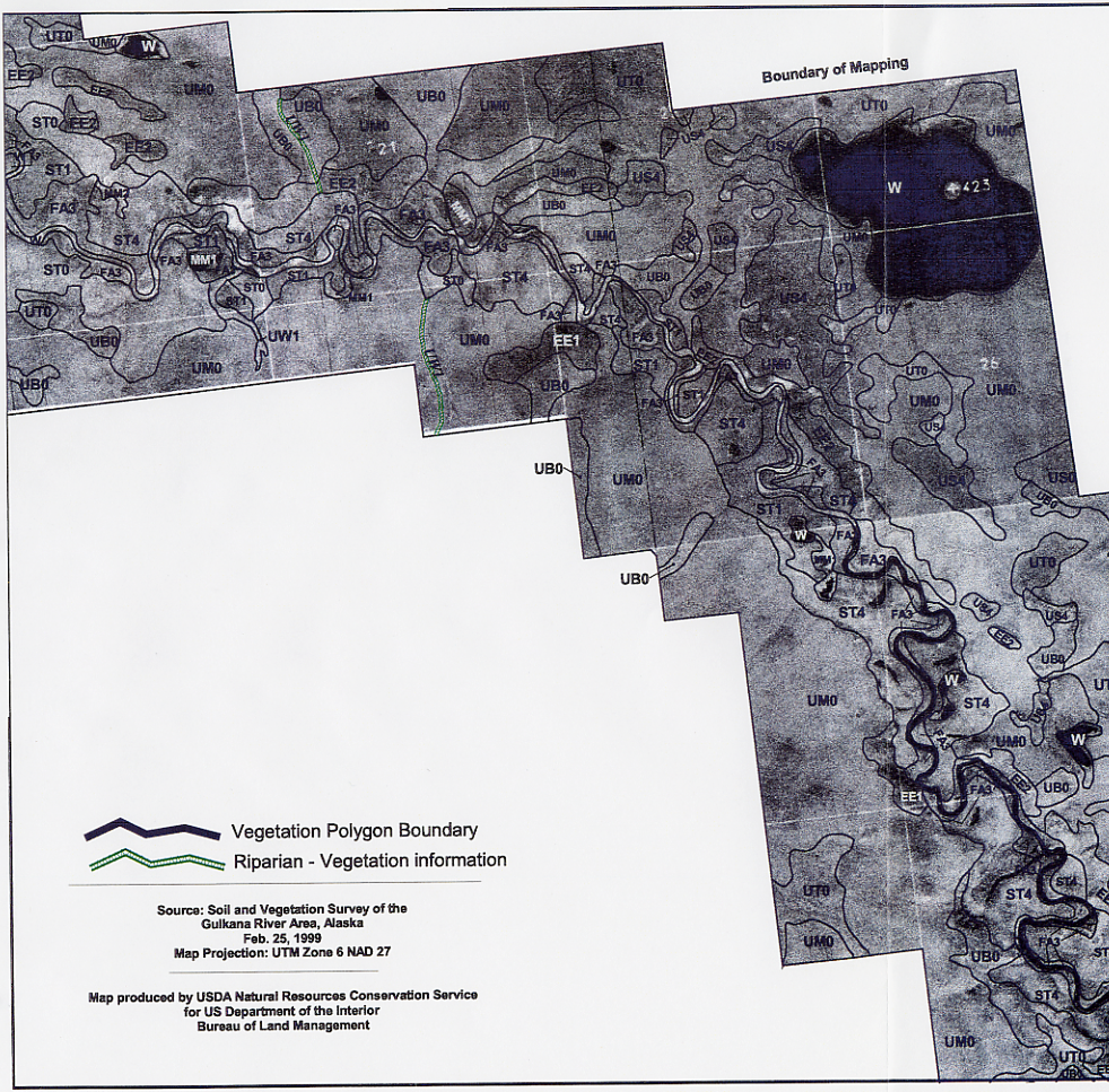
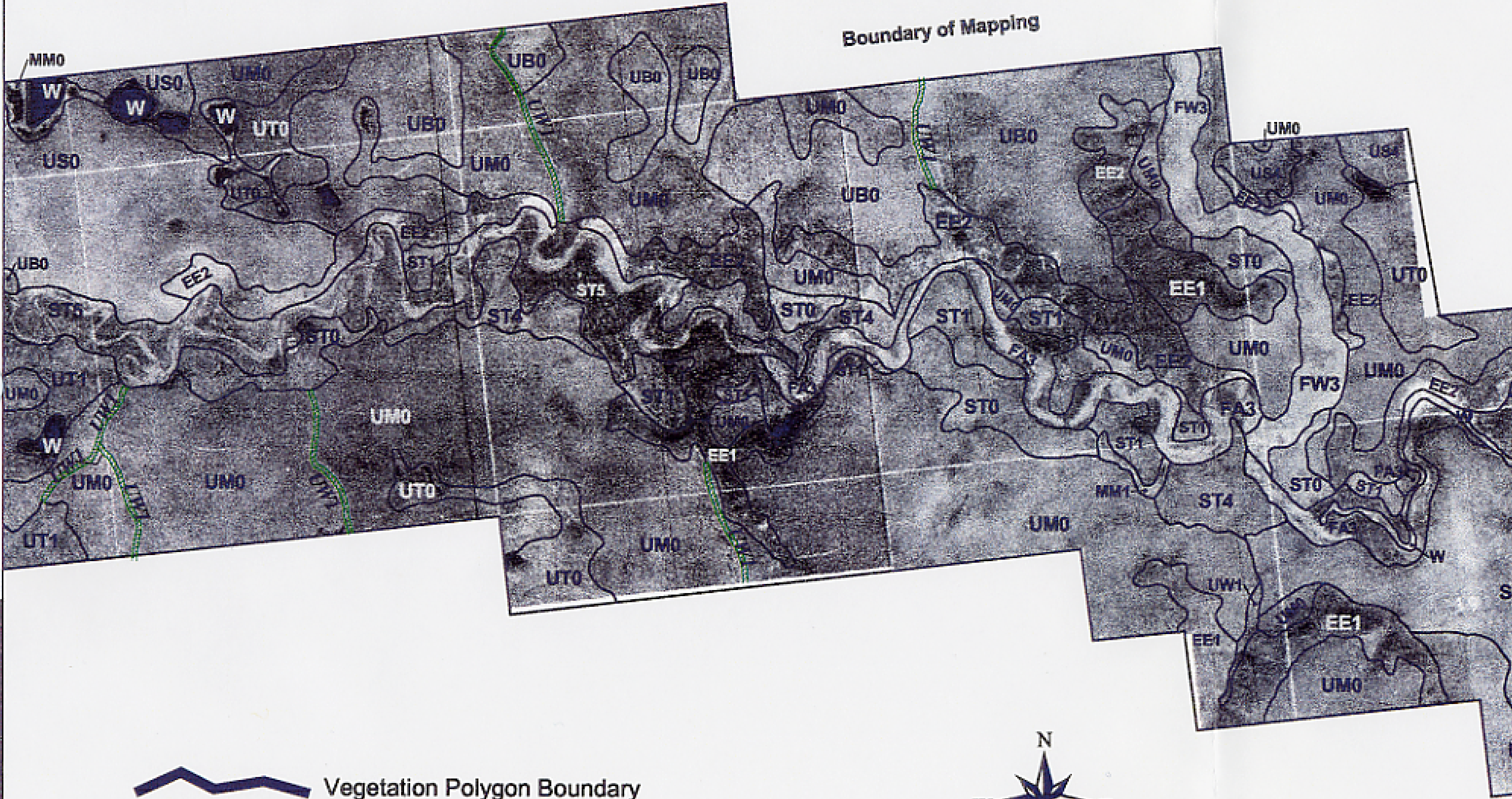


Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27

Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management

Vegetation

Sheet 17 of 18



Vegetation Polygon Boundary

Riparian - Vegetation information

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Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27

Map produced by USDA Natural Resources Conservation Service
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Bureau of Land Management

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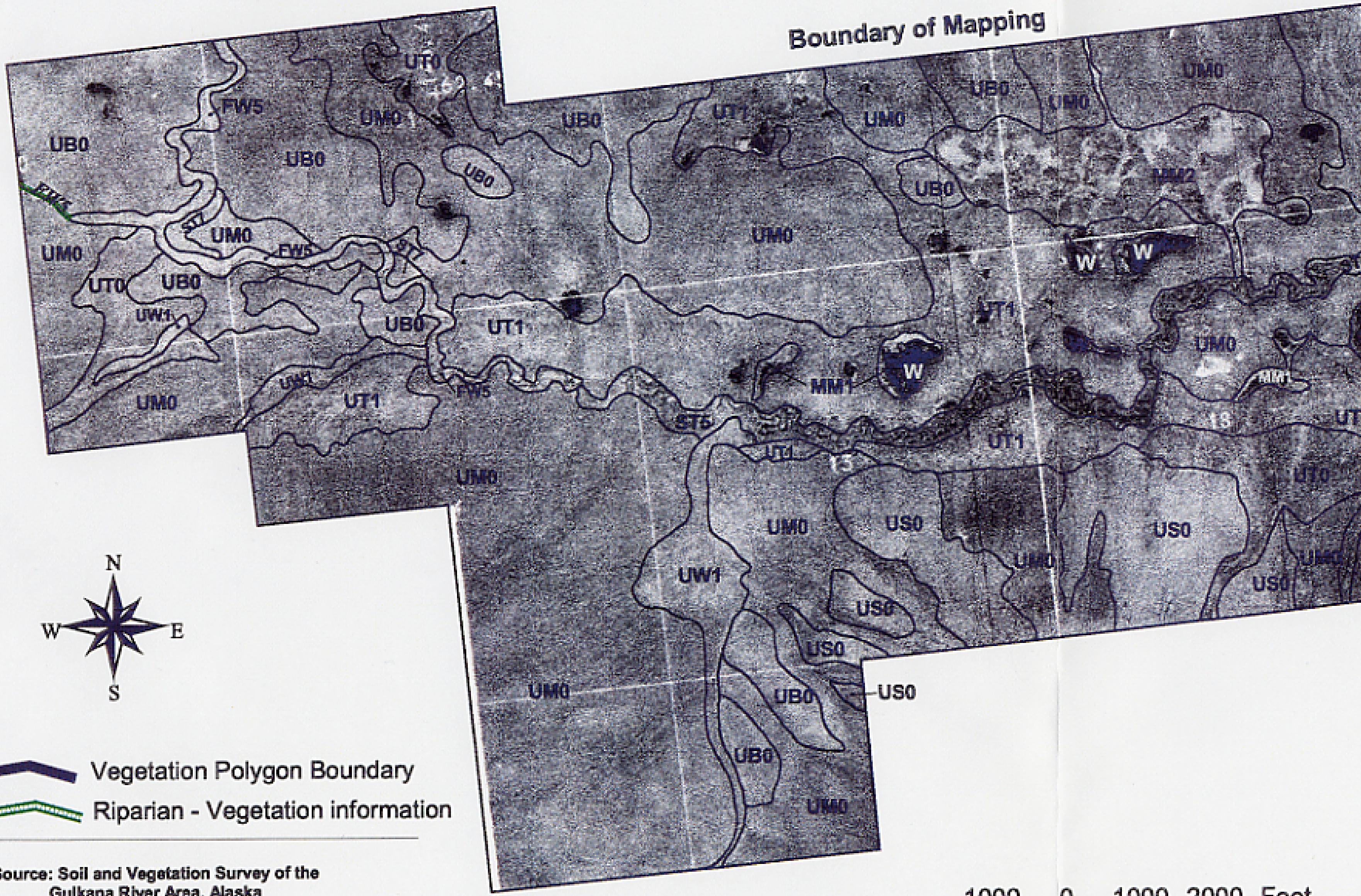

Vegetation Polygon Boundary

Riparian - Vegetation information

Source: Soil and Vegetation Survey of the Gulkana River Area, Alaska
Feb. 25, 1999
Map Projection: UTM Zone 6 NAD 27

Map produced by USDA Natural Resources Conservation Service for US Department of the Interior Bureau of Land Management

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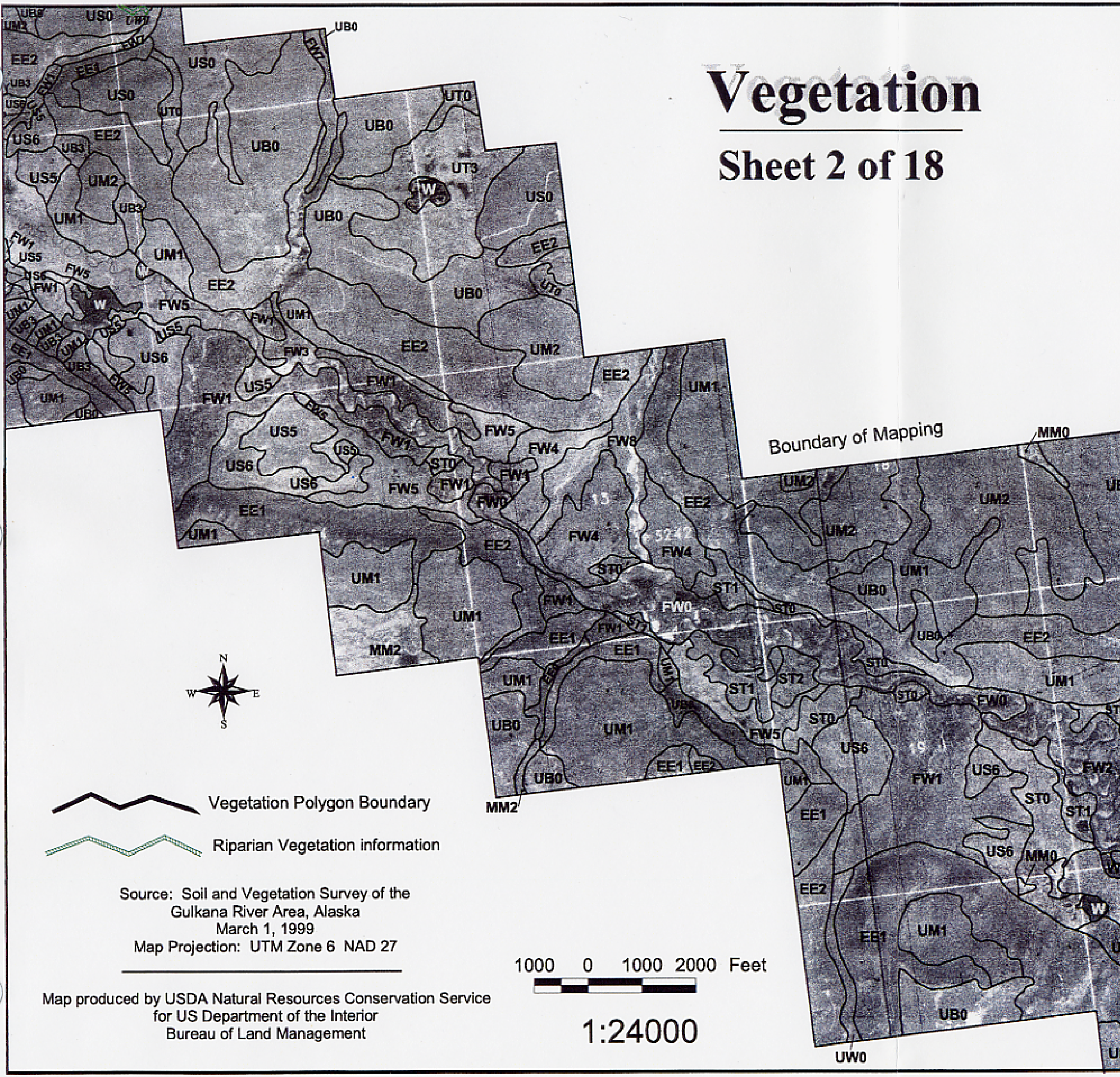
Vegetation
Sheet 2 of 18
Boundary of Mapping
Vegetation Polygon Boundary
Riparian Vegetation information
Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
March 1, 1999
Map Projection: UTM Zone 6 NAD 27
Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management
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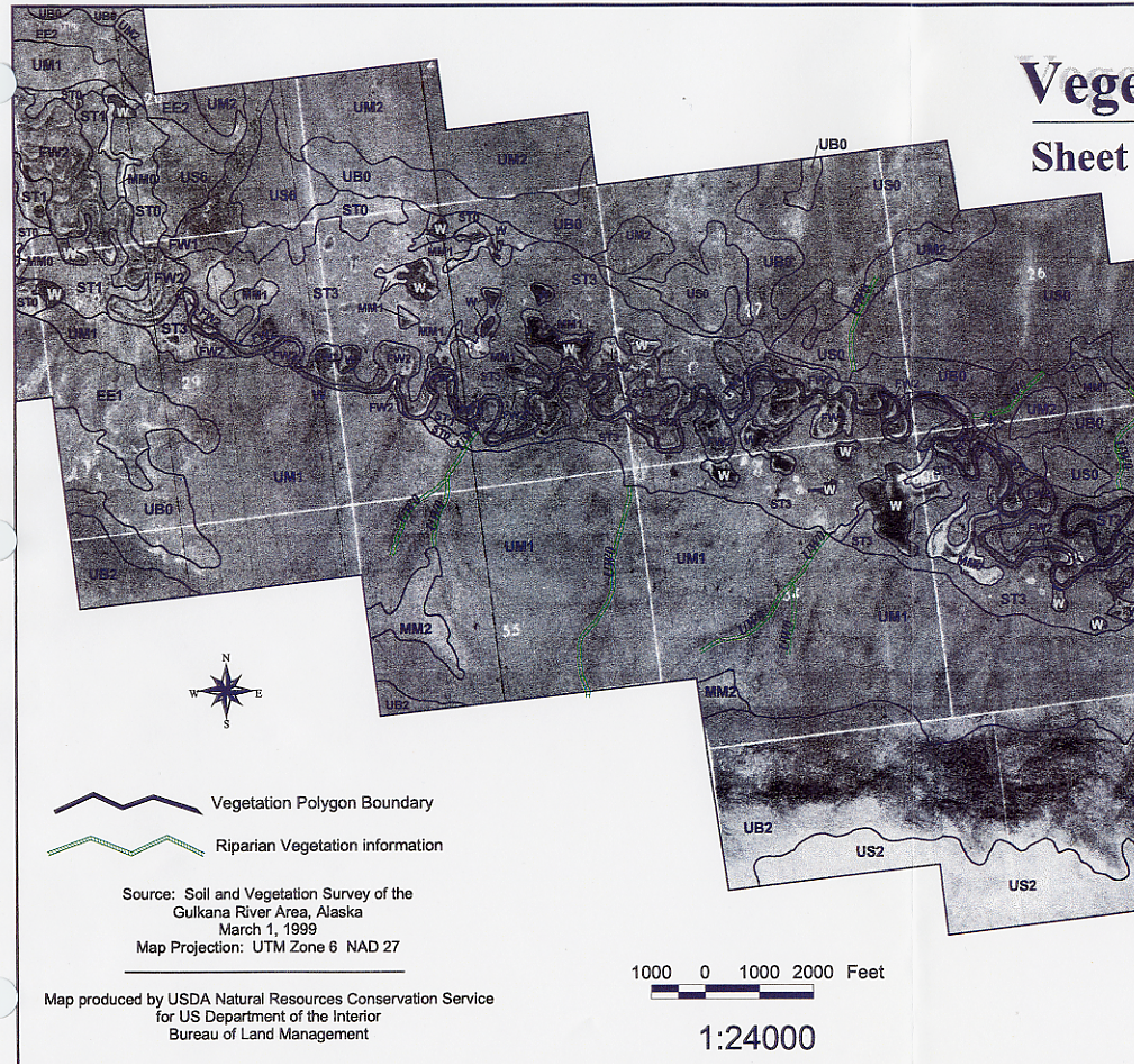

Vegetation Polygon Boundary

Riparian Vegetation information

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March 1, 1999
Map Projection: UTM Zone 6 NAD 27

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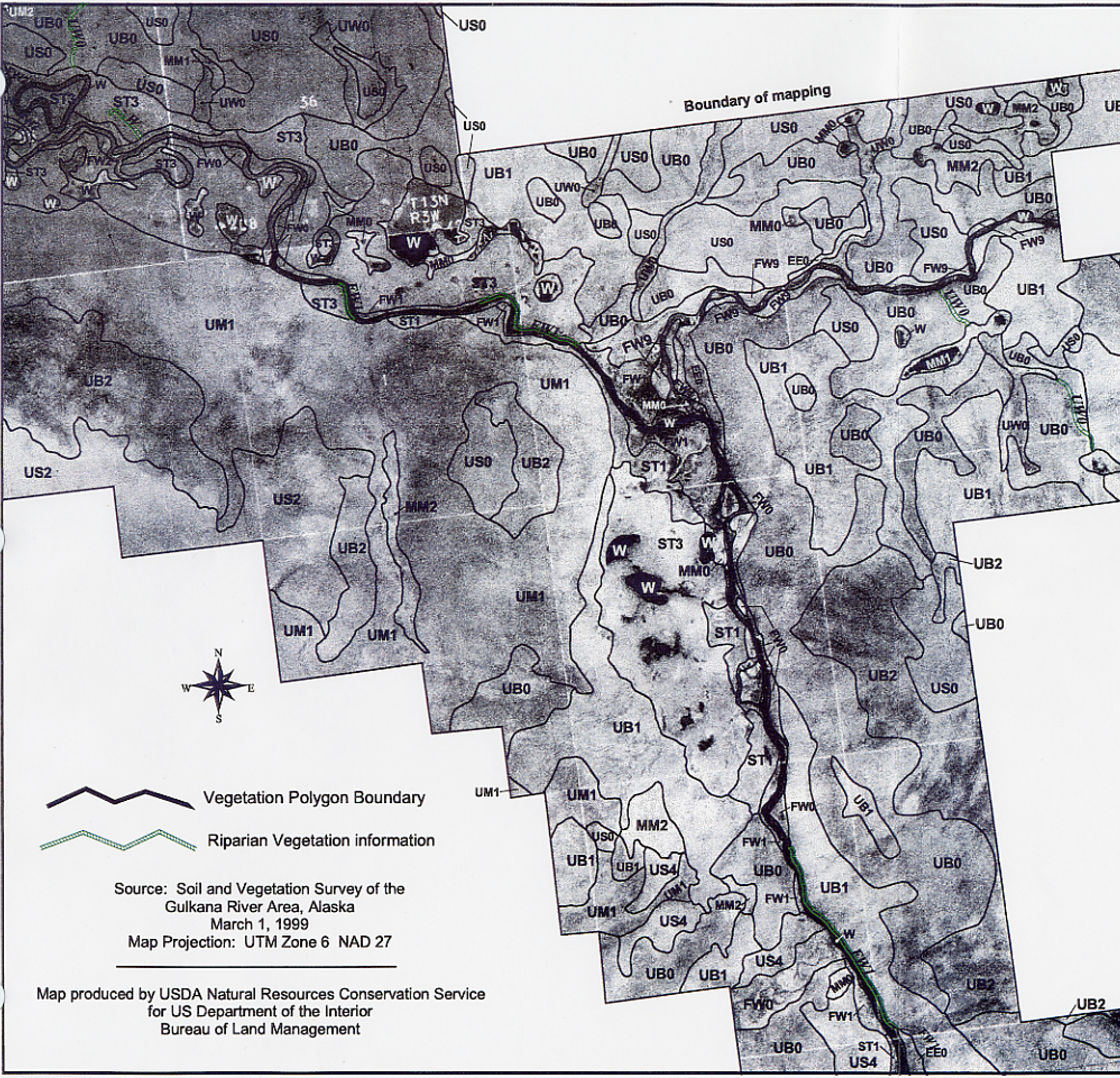
Boundary of mapping
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Vegetation Polygon Boundary
Riparian Vegetation information
Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
March 1, 1999
Map Projection: UTM Zone 6 NAD 27
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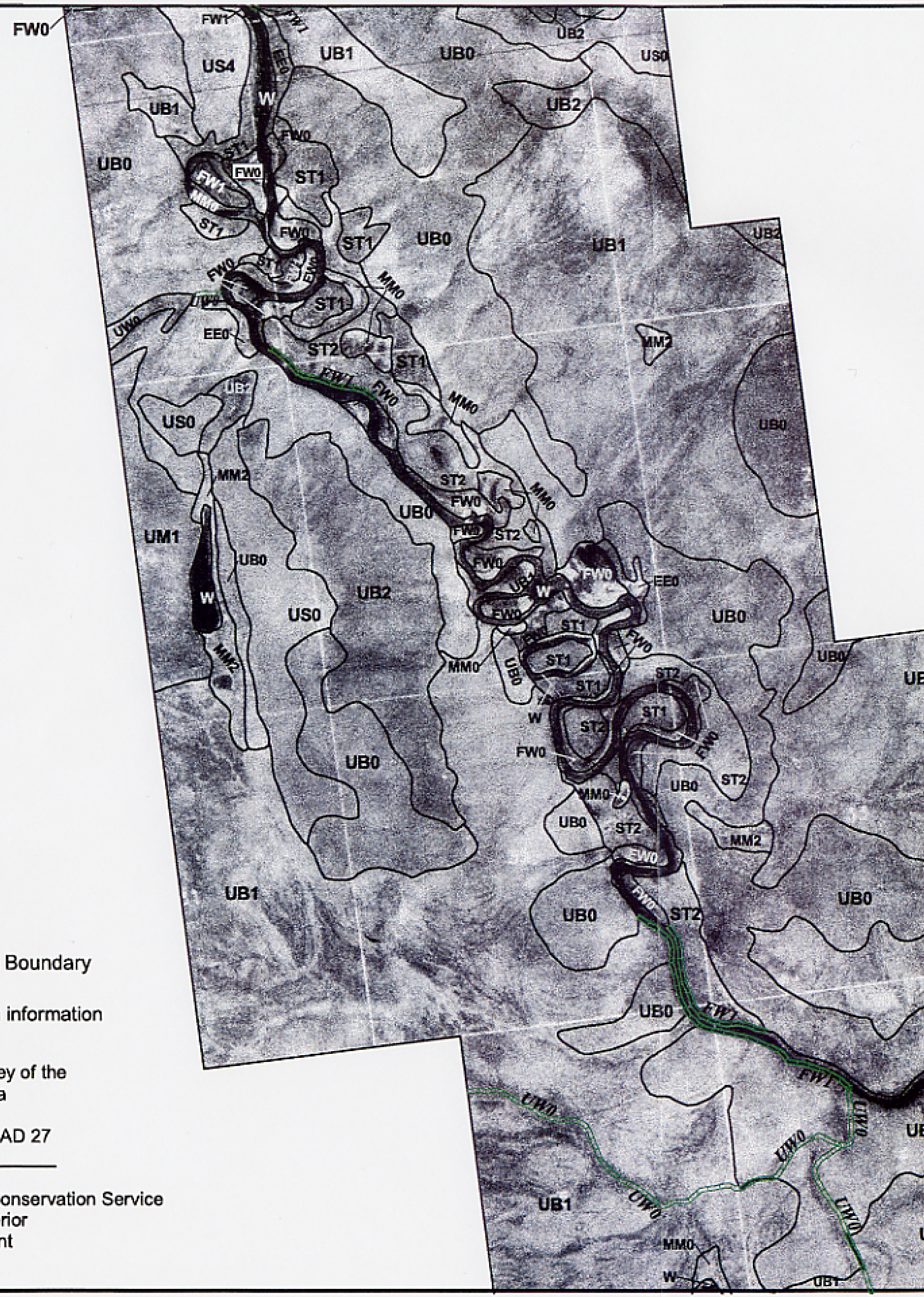
for US Department of the Interior
Bureau of Land Management

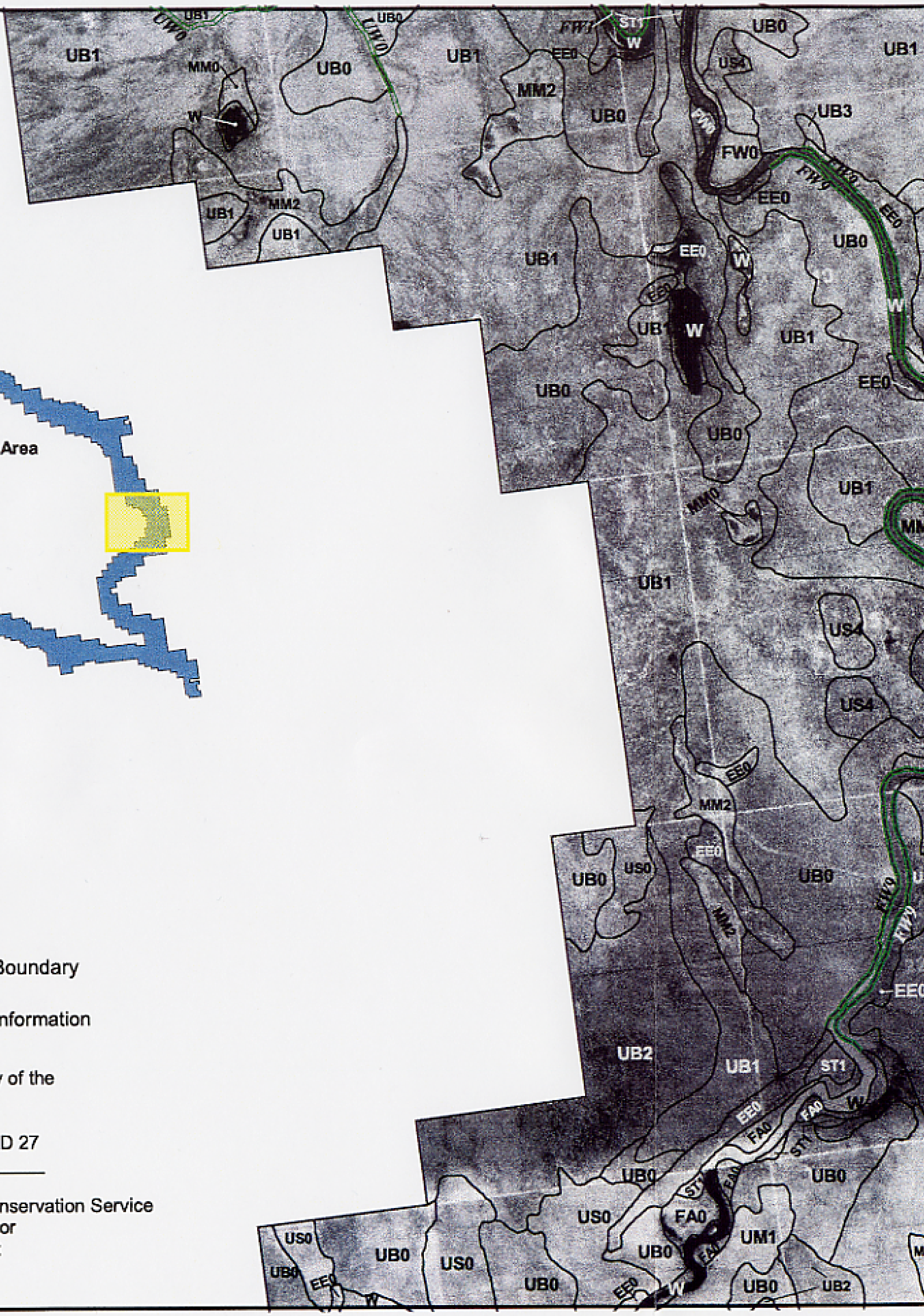


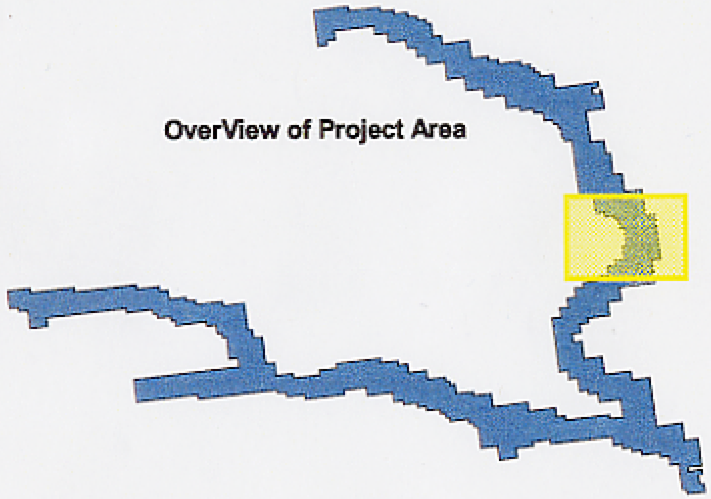
Vegetation Polygon Boundary

Riparian Vegetation information

Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
March 1, 1999
Map Projection: UTM Zone 6 NAD 27

Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management





Vegetation Polygon Boundary

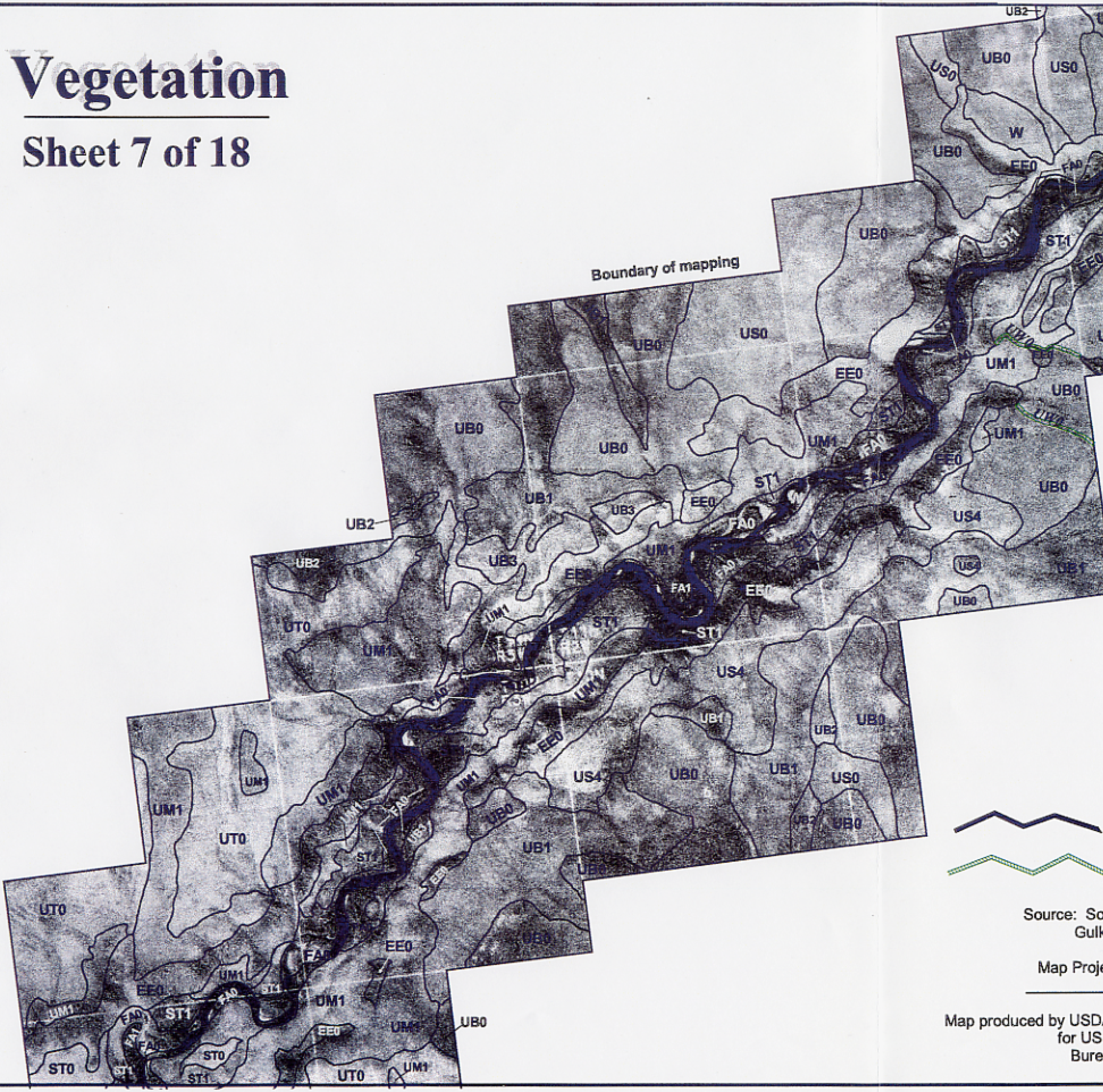
Riparian Vegetation information

Source: Soil and Vegetation Survey of the
Gulkana River Area, Alaska
March 1, 1999
Map Projection: UTM Zone 6 NAD 27

Map produced by USDA Natural Resources Conservation Service
for US Department of the Interior
Bureau of Land Management

Vegetation

Sheet 7 of 18



Source: So
Gulk

Map Proje

Map produced by USD
for US
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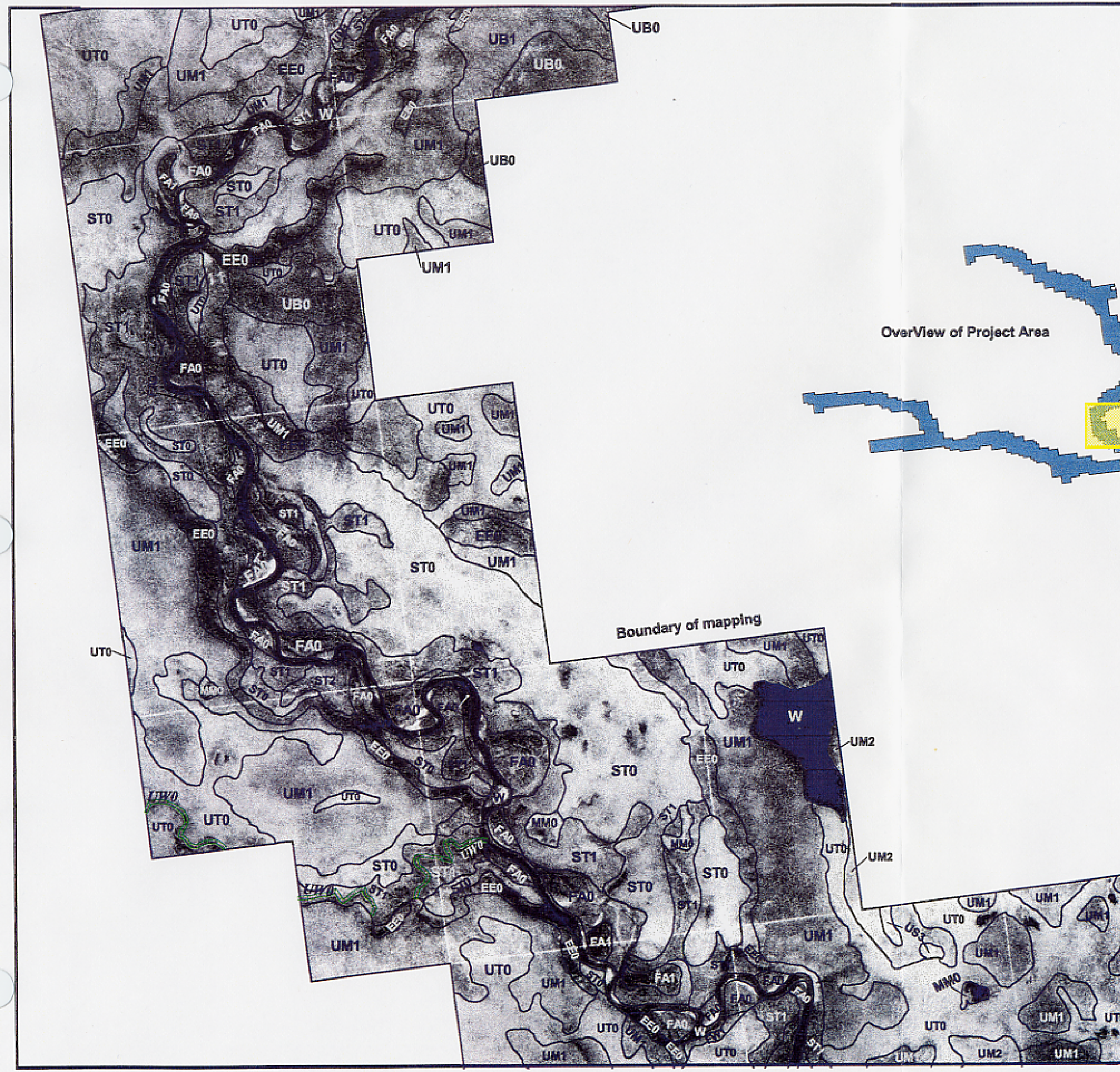
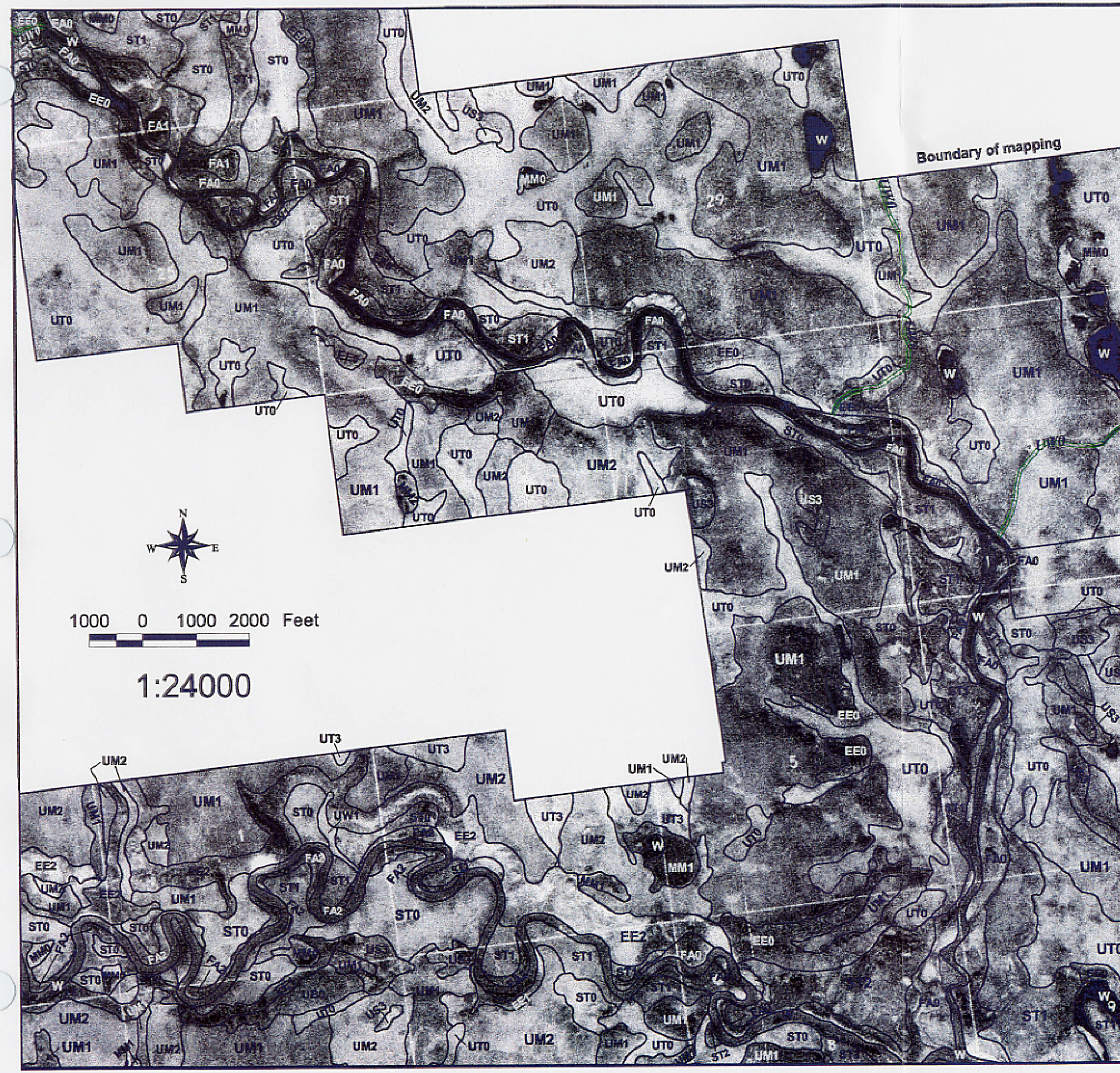

OverView of Project Area
Boundary of mapping



Boundary of mapping
N
S
E
W
1000 0 1000 2000 Feet
1:24000